FIVE ESTUARIES OFFSHORE WIND FARM

6.6.8.2 TRAFFIC AND TRANSPORT BASELINE REPORT - PART 6 (CLEAN)

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Appendix U Workforce Distribution Calculations

Volume 6, Part 6, Annex 8.1 Transport Assessment (Onshore)

Five Estuaries Offshore Wind Farm

Five Estuaries Wind Farm Ltd

SLR Project No.: 404.V05356.00010

23 September 2024

Appendix U: Workforce Vehicle Distribution

MSOA	Description	MSOA 003	MSOA 005	MSOA 007	Assignment	
Tendring 001	Harwich	2.6%	0.6%	1.9%	1.7%	average of MSOAs
Tendring 002	Harwich	5.0%	1.3%	2.0%	2.8%	average of MSOAs
Tendring 003	Manningtree (north and south of A120 to the east of A133	23.9%	6.6%	3.0%	11.2%	average of MSOAs
Tendring 004	West of Harwich	5.9%	1.8%	3.7%	3.8%	average of MSOAs
Tendring 005	North and south of the A120, west of the A133	2.6%	8.3%	1.4%	4.1%	average of MSOAs
Tendring 006	Walton on the Naze and Frinton	1.0%	1.1%	5.5%	2.5%	average of MSOAs
Tendring 007	Thorpe-le Soken and areas to the east of the A133	3.0%	1.7%	12.8%	5.8%	average of MSOAs
Tendring 008	Kirby Cross / Great Holland	2.8%	1.0%	8.5%	4.1%	average of MSOAs
Tendring 009	Arlesford / B1027 corridor	2.2%	5.9%	3.2%	3.7%	average of MSOAs
Tendring 010	North east Clacton	1.0%	1.1%	4.5%	2.2%	average of MSOAs
Tendring 011	Point Clear, St Osyth	1.9%	3.5%	2.9%	2.8%	average of MSOAs
Tendring 012	Holland on Sea	0.8%	0.4%	3.1%	1.4%	average of MSOAs
Tendring 013	North west Clacton	1.2%	1.5%	5.1%	2.6%	average of MSOAs
Tendring 014	Central Clacton	1.2%	1.1%	5.3%	2.5%	average of MSOAs
Tendring 015	Central Clacton	1.5%	1.1%	3.8%	2.2%	average of MSOAs
Tendring 016	Central Clacton	0.5%	0.7%	2.5%	1.2%	average of MSOAs
Tendring 017	Central Clacton	0.8%	1.0%	3.3%	1.7%	average of MSOAs
Tendring 018	St Osyth	0.9%	0.7%	3.7%	1.8%	average of MSOAs
Colchester 001	North Colchester (A12/A120 for all journeys)	0.1%	2.1%	0.5%	2.1%	max of MSOAs
Colchester 002	North Colchester (A12/A120 for all journeys)	0.0%	2.5%	1.2%	2.5%	max of MSOAs
Colchester 003	North Colchester (A12/A120 for all journeys)	0.0%	1.1%	0.5%	1.1%	max of MSOAs
Colchester 004	North Colchester (A12/A120 for all journeys)	0.0%	1.9%	1.3%	1.9%	max of MSOAs
Colchester 007	Central Colchester (A133 Clacton Road for all journeys)	0.1%	1.5%	0.6%	1.5%	max of MSOAs
Colchester 008	Central Colchester (A133 Clacton Road for all journeys)	0.0%	3.1%	0.7%	3.1%	max of MSOAs
Colchester 009	Central Colchester (A133 Clacton Road for all journeys)	0.0%	0.7%	0.6%	0.7%	max of MSOAs
Colchester 010	Central Colchester (A133 Clacton Road for all journeys)	0.0%	0.8%	0.5%	0.8%	max of MSOAs
Colchester 011	Central Colchester (A133 Clacton Road for all journeys)	0.0%	2.4%	0.8%	2.4%	max of MSOAs
Colchester 012	West Colchester (A12/A120 for all journeys)	0.0%	1.1%	0.5%	1.1%	max of MSOAs
Colchester 013	Central Colchester (A133 Clacton Road for all journeys)	0.0%	1.5%	0.7%	1.5%	max of MSOAs
Colchester 014	Central Colchester (A133 Clacton Road for all journeys)	0.0%	1.8%	0.5%	1.8%	max of MSOAs
Colchester 015	South Colchester (B1027 for Beach and Section 1, A133 Clacton Road to A133 for Sections 2 - 4a and A133 Clacton Road to Harwich Road and A120 for Sections 4b - 7)	0.0%	1.1%	0.5%	1.1%	max of MSOAs
Colchester 016		0.0%	2.2%	1.0%	2.2%	max of MSOAs
Colchester 017		0.0%	3.7%	0.7%	3.7%	max of MSOAs
Colchester 018		0.0%	2.7%	0.5%	2.7%	max of MSOAs
Colchester 019		0.0%	1.1%	0.2%	1.1%	max of MSOAs
Colchester 020		0.0%	0.3%	0.1%	0.3%	max of MSOAs
Colchester 021		0.0%	1.5%	0.5%	1.5%	max of MSOAs
Babergh	A12 North	10.8%	5.9%	1.4%	6.0%	average of MSOAs
Ipswich	A12 North	4.4%	2.4%	1.5%	4.4%	Max of MSOAs
Braintree	A12 South	1.8%	4.5%	1.0%	2.4%	average of MSOAs
Mid Suffolk	A12 North	1.1%	1.2%	0.6%	1.0%	average of MSOAs
Chelmsford	A12 South	0.8%	1.1%	0.5%	0.8%	average of MSOAs
Suffolk Coastal	A12 North	2.0%	1.3%	0.9%	1.4%	average of MSOAs
Other (all A12/A120)	A12 South or A12 North	20.2%	10.9%	5.8%	12.3%	average of MSOAs

Workforce Distribution	
A12 North	18.9%
A12 South	9.4%
Colchester	24.5%
Colchester via A12/A120	8.8%
A120 East of A133 / Manningtree	19.5%
Tendring via A120 (north of A133)	4.1%
B1027 corridor south of Colchester	8.3%
Clacton	13.8%
Frinton / Walton on the Naze	6.6%
Thrope-Le-Soken and surrounding areas	5.6%
Total	**119.5%**

Appendix V Bentley Road, Ardleigh Road and New Link Road Construction Methodologies and Parameters

Contractor Coversheet

Project Name:	FE_NF_Mott Macdonald Co-Located Substation Studies	**Package No:**	PROJECTCODE 12 - Electrical Systems

Document Title:	Co-located AIS Substations Early Design - Bentley Road, Ardleigh Road and New Link Road Construction Methodologies and Parameters Technical Note
Classification:	Confidential

Contractor Doc. No:	104560-MMD-00-XX-TN-CE-1051	**Contractor Revision:**	06
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Document Status:	Preliminary		
Reason for Issue	Review		

MOTT MACDONALD

Co-Located Substation Early Design

Bentley Road, Ardleigh Road and New Link Road Construction Methodologies and Parameters

November 2023

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Mott MacDonald
Victory House
Trafalgar Place
Brighton BN1 4FY
United Kingdom

T +44 (0)1273 365000
mottmac.com

Co-Located Substation Early Design

Bentley Road, Ardleigh Road and New Link Road Construction Methodologies and Parameters

November 2023

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Issue and Revision Record

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Rev02	27/09/23	O. Jeffcock/ M. Stedman	J. Weeks	A. F. Crespo	Cycle track added
Rev03	20/10/23	O. Jeffcock	J. Weeks	A. F. Crespo	Option 3 added
Rev04	01/11/23	O. Jeffcock	J. Weeks	A. F. Crespo	Option 3 revised
Rev05	07/11/23	O. Jeffcock	J. Weeks	A. F. Crespo	Table 3.3 and 3.8 updated
Rev06	09/11/23	O. Jeffcock	J. Weeks	A. F. Crespo	Table 3.3 updated

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Contents

Tables

Figures

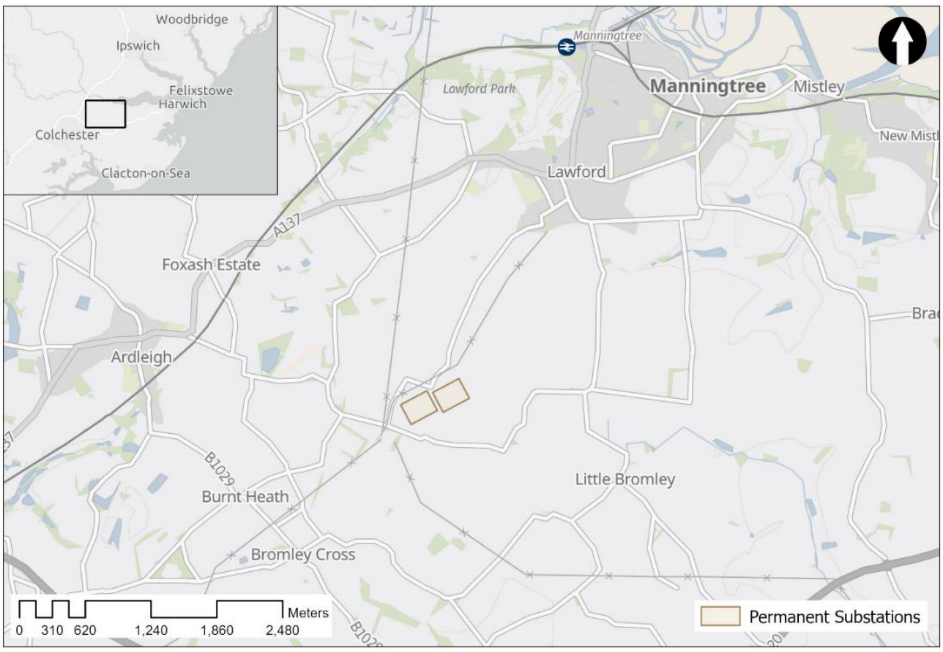
1 Introduction

RWE Renewables have procured Mott MacDonald to review the potential for a Co-Located substation site to accommodate the onshore substations for the Five Estuaries and North Falls Windfarms. This document presents an overview of the relevant impact metrics during the road improvements works and road construction required to facilitate the construction of the two substations.

1.1 Site location

The proposed substation site is located near Little Bromley, a village within the Tendring District of Essex. The centre of the proposed development is at approximate grid reference TM 08105 28880, nearest postcode is CO11 2ND and Colchester city is located approximately 5km southwest. The location of the site boundary is indicated in Figure 1.1.The site is constrained by Grange Road along its west and north border and Ardleigh Road along the south border. The eastern border is a field boundary.

Figure 1.1: Site location



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To facilitate the construction of the two substations, it is proposed that road improvements are made to Ardleigh Road and Bentley Road and two new haul roads are constructed linking the two roads. The first haul road follows the cable corridor from Bentley Road to the substation site. This will be referred to as the cable corridor haul road. The second haul road will be used for Abnormal Invisible Loads (AILs) so will be referred to as the AIL haul road.

It is assumed that the transformers and cable drums will be delivered to Harwich International Port approximately 16.5km northeast of the site. The transformer movements are seen as the worst case in terms of geometry requirements and have been modelled using a AL50 Girder 24 axial transporter. The vehicles will travel south from the port on the A120 before heading

northwest on Bentley Road. The vehicles will then make a lefthand turn and head west on the new AIL haul road which connects to Ardleigh road and leads to the substation site. The majority of other construction traffic will reach the A120 – Bentley Road junction from the south. After travelling north on Bentley Road, the construction traffic will make a left hand turn onto the cable corridor haul road to the substation site. The construction metrics associated with the cable corridor haul road will not be included in this technical note. The road will be included in the programme as it must be constructed before the Ardleigh Road improvements and the AIL haul road can be constructed.

When leaving the site, construction traffic will follow the same route back to the A120 – Bentley Road junction. There will be no right turn for vehicles at the junction. Therefore, all construction traffic will make a left turn and travel north on the A120, using the first roundabout to turn around if required.

This technical note presents the construction parameters for three options for the road improvements. Option 1 is the standard widening of Ardleigh Road and Bentley Road, and the installation of the new haul road. Option 2 and 3 include all tasks in option 1 with the addition of a cycle track along Bentley Road up to the cable haul road section.

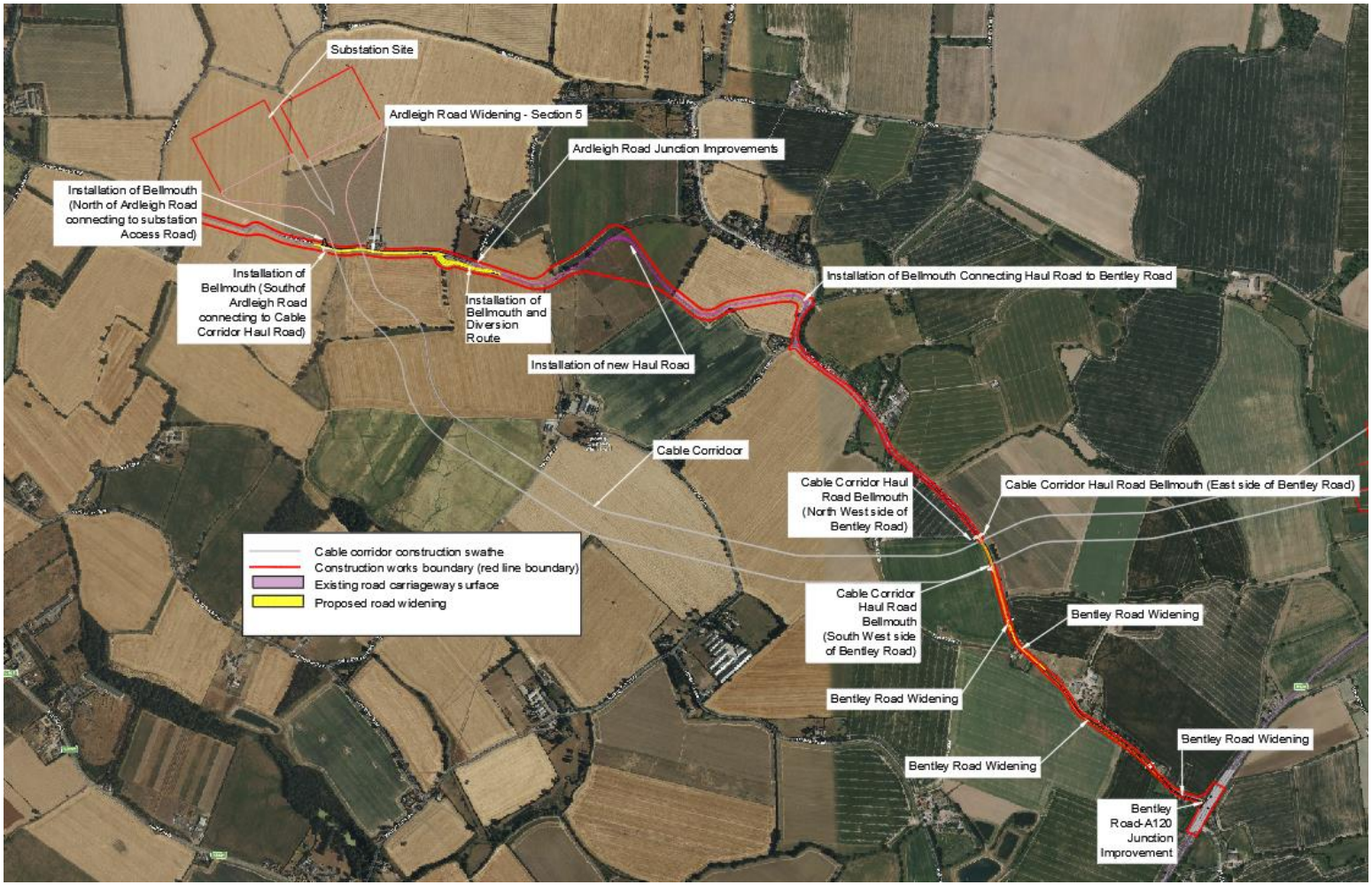
For option 1 and 2, the works on Bentley Road include widening of the A120 – Bentley Road bellmouth, 4 sections of widening to Bentley Road, diversions of OHLs, the relocation of utility poles and the removal or cutting back of hedgerows and trees. Refer to drawing 004781329 for the A120 – Bentley Road junction improvements. Refer to drawings 004786178, 004786179, 004786180, 004786181 and 004786182 for the Bentley Road improvements.

For option 3, the works include the widening of the A120 – Bentley Road bellmouth with 3 sections of widening to Bentley Road. The widening works are similar to option 1 but the widened road width is 6.5m with a separate cycle track as per drawing 107850-MMD-04-XX-DWG-D-1896.

The new AIL haul road is approximately 1.1km long and spans between Bentley Road and Ardleigh Road. The works to facilitate the construction on the road include the construction of a new bellmouth connecting the new road to Bentley Road, the construction of swales, a culvert for the road crossing and swale crossings. Refer to drawing 004786173 for details of the new haul road.

The works on Ardleigh Road include widening of the existing road, improvements to the Ardleigh Road Junction, a road diversion to the south of Ardleigh Road, construction of swales, swale crossings, the demolition of existing culvert, construction of new culvert, removal of trees and the cycle track. Refer to drawings 004786174, 004786175, 004786176, 004786177 00480102 and 004921122 for details.

Figure 1.2: Site layout plan



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2 Construction methodologies

2.1 Construction Methodologies

An overview of the construction works is outlined in Table 2.1. The table shows the programme for all the works at both Ardleigh Road, Bentley Road and the new haul road.

Table 2.1: Construction Activities

Step	Construction Activity
	Cable haul road access work assumed undertaken by others
1	Bentley Road - Cable Corridor Haul Road Bellmouth East side of Bentley Road)
2	Bentley Road - Cable Corridor Haul Road Bellmouth (Northern Bellmouth, West side of Bentley Road)
	A120 - Bentley Road Bellmouth improvements
3	Relocation of UKPN Electricity Post
4	A120 – Bentley Road Junction Improvements
	Bentley Road Improvements
5	Bentley Road Widening - Section 1
6	Bentley Road Widening - Section 2
7	Bentley Road Widening - Section 3
8	Bentley Road Widening - Section 4
9	Bentley Road - Cable Corridor Haul Road Bellmouth (Southern Bellmouth, West side of Bentley Road)
10	Installation of Bellmouth (South of Ardleigh Road connecting to new Haul Road)
11	Installation of Bellmouth (North of Ardleigh Road connecting to substation Access Road)
	Ardleigh Road Improvements
12	Ardleigh Road Widening - Section 5 (Between Bellmouth and Ardleigh Road Diversion)
13	Installation of Bellmouth and Diversion Route
14	Ardleigh Road Junction Improvements
	New Haul Road
15	Installation of new AIL Haul Road
16	Installation of Bellmouth (Connection for Haul Road to Bentley Road)
17	Vegetation clearance, Utility diversions Between Cable route Hall Road bellmouths and AIL Haul Road

Within Option 2 and 3 the cycle track works are completed within the Bentley Road Widening works, either as part of the road widening (Option 2) or as a separate concurrent activity (Option 3).

Table 2.2 shows the construction activities that will be implemented for each of the road widening sections and the new haul road.

Table 2.2: Construction activities

Step	Construction Activity
1	Installation of Traffic Management
2	Utility Diversions
3	Vegetation clearance
4	Topsoil Strip
5	Realignment/Creation of Drainage features
6	Excavate to Formation
7	Installation of subbase/ Capping
8	Installation of Pavement Material
9	White Lining
10	Removal of Traffic Management

2.2 Construction Programme

2.2.1 Assumptions

The below assumptions have been used for the development of the programme and estimation of the overall programme duration:

- Access for the construction of the cable construction haul road between Bentley Road and Ardleigh Road and the associated bellmouths off Bentley Road, would be from the east, utilising the continuing cable construction haul road. This enables the haul road to be constructed whilst the Bentley Road improvements are made. The activates have arbitrarily been shown to occur at the same time however the cable works designer will need to confirm their programme for these works.
- Widening of sections 1 and 3 and subsequently sections 2 and 4 of Bentley Road will occur simultaneously these works would require a significant length of traffic management which will need to be agreed with the Local Highways Authority.
- Under Option 3 it has been assumed that the cycle track can be constructed with additional resource within the same time frame as Option 1, due to the separation between the carriageway and the cycle track.

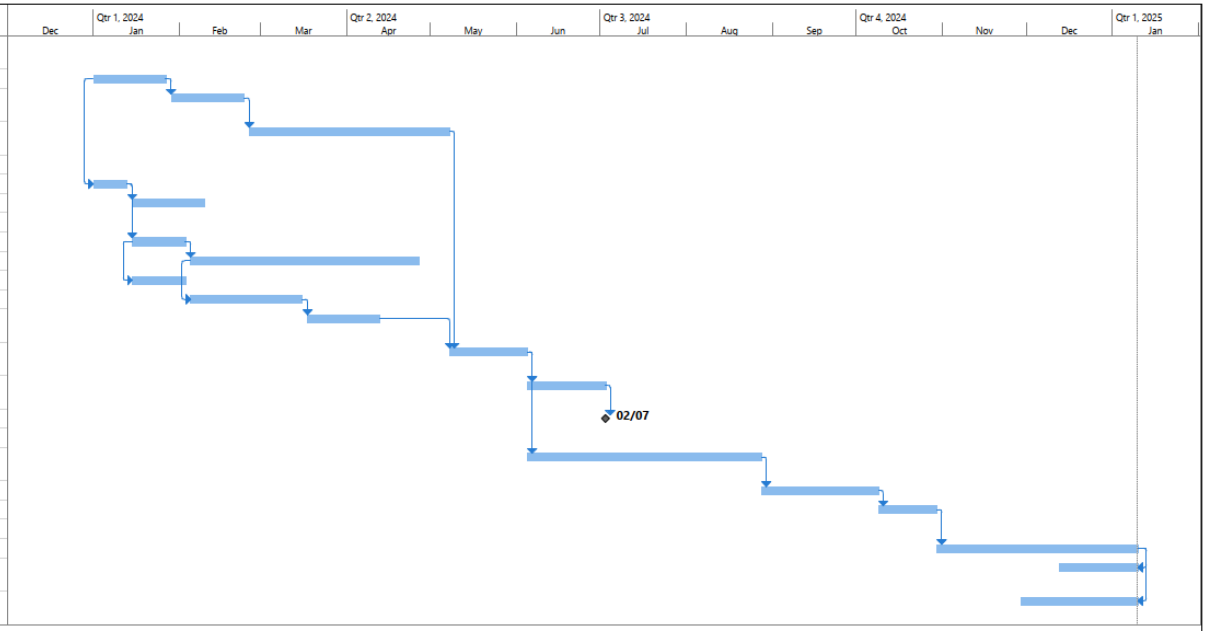
2.2.2 Option 1 and 3 Construction Programme

Figure 2.1 presents construction overview of key activities and durations (working days) for option 1 and 3.

Note the dates are only for reference and only durations are relevant.

Figure 2.1: Programme for Option 1 and Option 3

ID	Task Mode	Task Name	Duration	Start	Finish
1		Cable Haul Road Access works assumed undertaken by others	1 day?	Tue 08/08/23	Tue 08/08/23
2		Installation of Bellmouth (East side of Bentley Road)	4 wks	Mon 01/01/24	Fri 26/01/24
3		Installation of Bellmouth (Northern Bellmouth, West side of Bentley Road)	4 wks	Mon 29/01/24	Fri 23/02/24
4		Installation of Haul Road (Assumed 50m per day, to be confirmed by others)	52 days	Mon 26/02/24	Tue 07/05/24
5		A120 - Bentley Road Bellmouth improvements	1 day	Tue 08/08/23	Tue 08/08/23
6		Relocation of UKPN Electricity Post	2 wks	Mon 01/01/24	Fri 12/01/24
7		Junction Improvements	4 wks	Mon 15/01/24	Fri 09/02/24
8		Bentley Road Improvements	1 day	Tue 08/08/23	Tue 08/08/23
9		Widening - Section 1	3 wks	Mon 15/01/24	Fri 02/02/24
10		Widening - Section 2	12 wks	Mon 05/02/24	Fri 26/04/24
11		Widening - Section 3	3 wks	Mon 15/01/24	Fri 02/02/24
12		Widening - Section 4	6 wks	Mon 05/02/24	Fri 15/03/24
13		Installation of Bellmouth (Southern Bellmouth, West side of Bentley Road)	4 wks	Mon 18/03/24	Fri 12/04/24
14		Installation of Bellmouth (South of Ardleigh Road connecting to new Haul Road)	4 wks	Wed 08/05/24	Tue 04/06/24
15		Installation of Bellmouth (North of Ardleigh Road connecting to substation Access Road)	4 wks	Wed 05/06/24	Tue 02/07/24
16		FIRST ACCESS TO SUBSTATION SITE	0 days	Tue 02/07/24	Tue 02/07/24
17		Ardleigh Road Improvements	1 day	Tue 08/08/23	Tue 08/08/23
18		Widening - Section 5 (Between Bellmouth and Ardielgh Road Diversion)	12 wks	Wed 05/06/24	Tue 27/08/24
19		Installation of Bellmouth and Diversion Route	6 wks	Wed 28/08/24	Tue 08/10/24
20		Ardliegh Road Junction Improvements	3 wks	Wed 09/10/24	Tue 29/10/24
21		New Haul Road	1 day	Tue 08/08/23	Tue 08/08/23
22		Installation of new Haul Road (Assumed 25m per day)	52 days	Wed 30/10/24	Thu 09/01/25
23		Installation of Bellmouth (Connection for Haul road to Bentley Road)	4 wks	Fri 13/12/24	Thu 09/01/25
24		Vegetation clearence, Utility diversions Bewteen Cable route Hall road bellmouths and New Haul Road	6 wks	Fri 29/11/24	Thu 09/01/25



Source: MML.

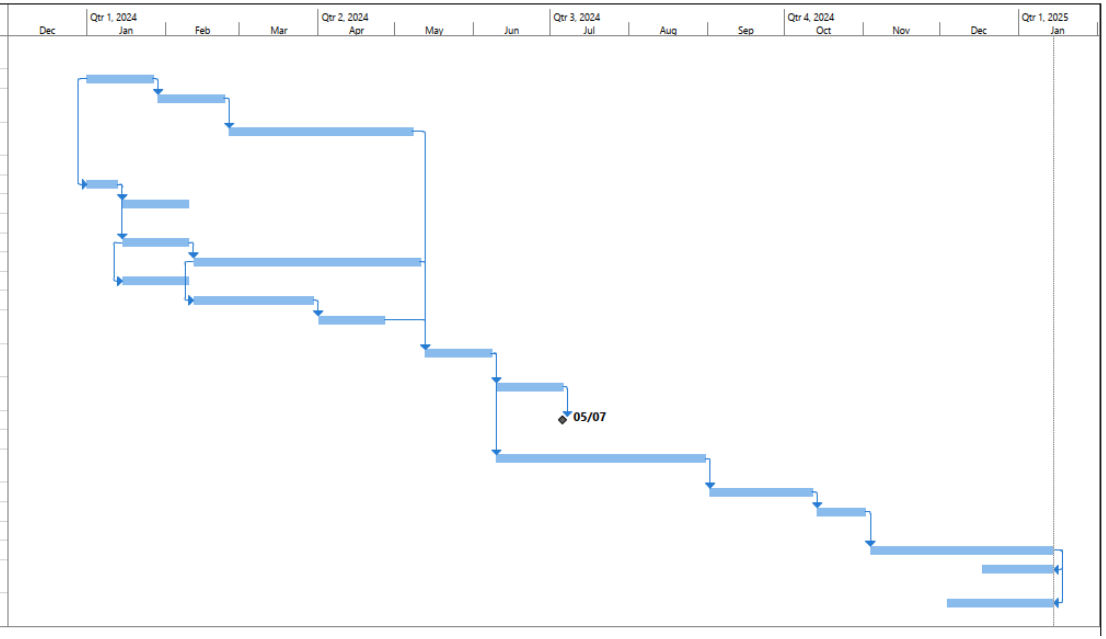
2.2.3 Option 2 Construction programme

Figure 2.2 presents construction overview of key activities and durations (working days) for option 2.

Note the dates are only for reference and only durations are relevant.

Figure 2.2: Programme for Option 2

ID	Task Mode	Task Name	Duration	Start	Predecessors	Finish
1		Cable Haul Road Access works assumed undertaken by others	1 day?	Tue 08/08/23		Tue 08/08/23
2		Installation of Bellmouth (East side of Bentley Road)	4 wks	Mon 01/01/24		Fri 26/01/24
3		Installation of Bellmouth (Northern Bellmouth, West side of Bentley Road)	4 wks	Mon 29/01/24	2	Fri 23/02/24
4		Installation of Haul Road (Assumed 50m per day, to be confirmed by others)	52 days	Mon 26/02/24	3	Tue 07/05/24
5		A120 - Bentley Road Bellmouth improvements	1 day	Tue 08/08/23		Tue 08/08/23
6		Relocation of UKPN Electricity Post	2 wks	Mon 01/01/24	2SS	Fri 12/01/24
7		Junction Improvements	4 wks	Mon 15/01/24	6	Fri 09/02/24
8		Bentley Road Improvements	1 day	Tue 08/08/23		Tue 08/08/23
9		Widening - Section 1 + Cycle track	4 wks	Mon 15/01/24	6	Fri 09/02/24
10		Widening - Section 2 + Cycle track	13 wks	Mon 12/02/24	9	Fri 10/05/24
11		Widening - Section 3 + Cycle track	4 wks	Mon 15/01/24	9SS	Fri 09/02/24
12		Widening - Section 4 + Cycle track	7 wks	Mon 12/02/24	10SS	Fri 29/03/24
13		Installation of Bellmouth (Southern Bellmouth, West side of Bentley Road)	4 wks	Mon 01/04/24	12	Fri 26/04/24
14		Installation of Bellmouth (South of Ardleigh Road connecting to new Haul Road)	4 wks	Mon 13/05/24	13,4,10	Fri 07/06/24
15		Installation of Bellmouth (North of Ardleigh Road connecting to substation Access Road)	4 wks	Mon 10/06/24	14	Fri 05/07/24
16		FIRST ACCESS TO SUBSTATION SITE	0 days	Fri 05/07/24	15	Fri 05/07/24
17		Ardleigh Road Improvements	1 day	Tue 08/08/23		Tue 08/08/23
18		Widening - Section 5 (Between Bellmouth and Ardleigh Road Diversion)	12 wks	Mon 10/06/24	14	Fri 30/08/24
19		Installation of Bellmouth and Diversion Route	6 wks	Mon 02/09/24	18	Fri 11/10/24
20		Ardliegh Road Junction Improvements	3 wks	Mon 14/10/24	19	Fri 01/11/24
21		New Haul Road	1 day	Tue 08/08/23		Tue 08/08/23
22		Installation of new Haul Road (Assumed 25m per day)	52 days	Mon 04/11/24	20	Tue 14/01/25
23		Installation of Bellmouth (Connection for Haul road to Bentley Road)	4 wks	Wed 18/12/24	22FF	Tue 14/01/25
24		Vegetation clearence, Utility diversions Bewteen Cable route Hall road bellmouths and New Haul Road	6 wks	Wed 04/12/24	22FF	Tue 14/01/25



Source: MML.

2.3 Employment Levels

2.3.1 Option 1 employment levels

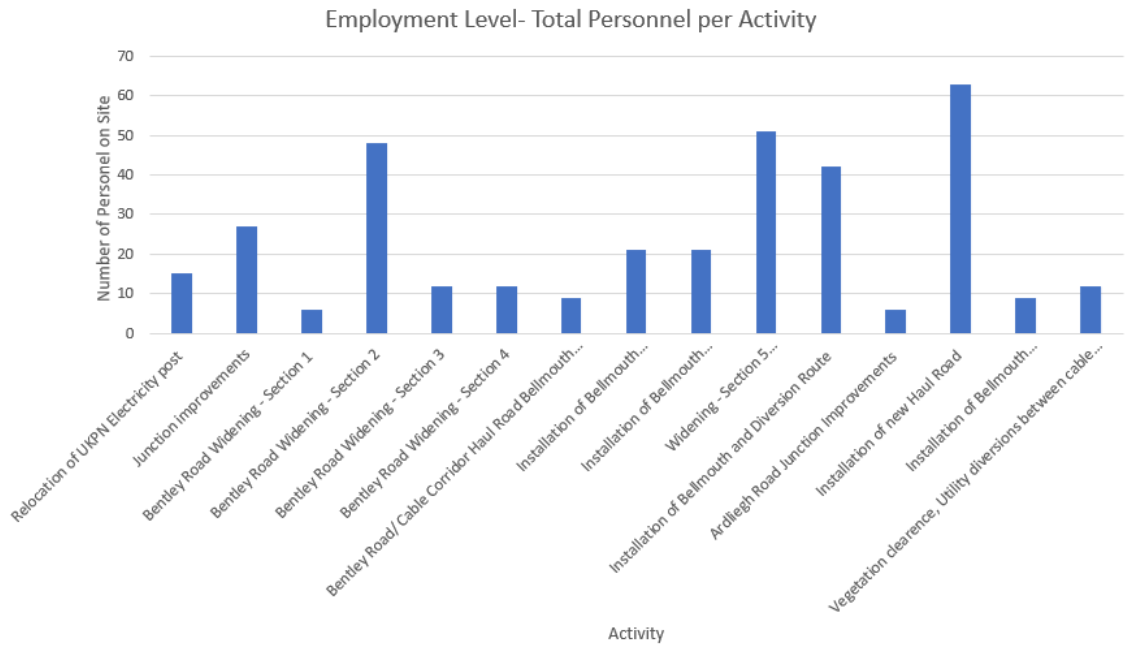
Table 2.3 shows the number of personnel on site for each activity throughout the access construction for option 1, note that administrative, supervisory and management staff have been added to one activity only within each month to avoid duplication.

Table 2.3: Option 1 Employment levels

		Months													
Phase	**Activity**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**Total**
Relocation of UKPN Electricity post	Relocation of UKPN Electricity post	15													15
A120 - Bentley Road Bellmouth improvements	Junction improvements	6	21												27
Bentley Road Improvements	Bentley Road Widening - Section 1	6													6
	Bentley Road Widening - Section 2		6	21	21										48
	Bentley Road Widening - Section 3	6	6												12
	Bentley Road Widening - Section 4		6	6											12
	Bentley Road/ Cable Corridor Haul Road Bellmouth (Southern Bellmouth, West side of Bentley Road)				9										9
	Installation of Bellmouth (South of Ardleigh Road connecting to new Haul Road)					21									21
	Installation of Bellmouth (North of Ardleigh Road connecting to substation Access Road)						21								21
Ardleigh Road Improvements	Widening - Section 5 (Between Bellmouth and Ardleigh Road Diversion)						9	21	21						51
	Installation of Bellmouth and Diversion Route									21	21				42
	Ardleigh Road Junction Improvements										6				6
New Haul Road	Installation of new Haul Road											21	21	21	63
	Installation of Bellmouth (Connection for Haul road to Bentley Road)													9	9
Vegetation clearance, Utility diversions between cable route hall road bellmouths and new haul road	Vegetation clearance, Utility diversions between cable route hall road bellmouths and new haul road												6	6	12
	Total average persons on site	33	39	27	30	21	30	21	21	21	27	21	21	30	
	Total labour days per month (Assuming 24 working days per Month)	792	936	648	720	504	720	504	504	504	648	504	504	720	

Figure 2.3 presents an estimated overview of the employment levels expected during each phase of the access construction.

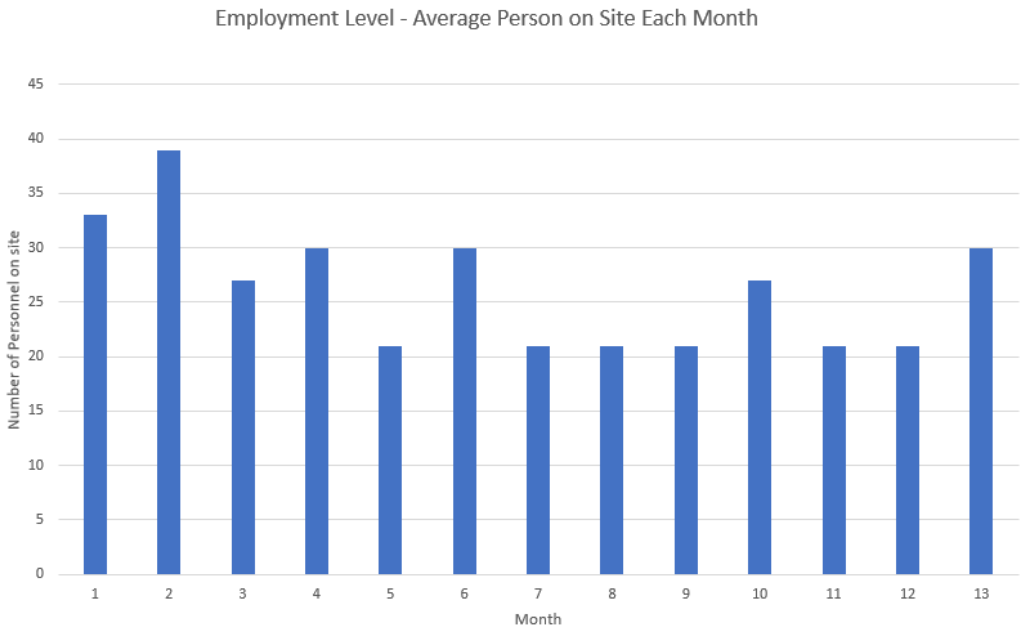
Figure 2.3: Employment levels per activity Option 1



Source: MML

Figure 2.4 presents an estimated overview of the employment levels each month through the duration of the access construction.

Figure 2.4: Employment levels per month Option 1



Source: MML

2.3.2 Option 2 and 3 employment levels

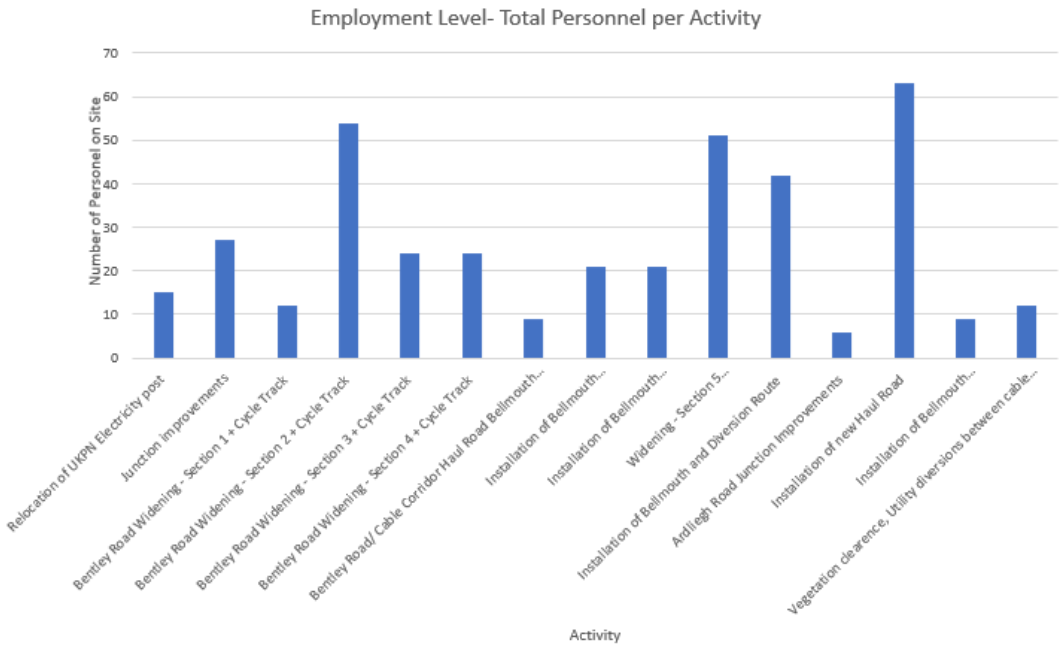
Table 2.4 shows the number of personnel on site for each activity throughout the access construction for option 2 and 3, note that administrative, supervisory and management staff have been added to one activity only within each month to avoid duplication.

Table 2.4: Option 2 and Option 3 Employment Levels

		Months													
Phase	**Activity**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**Total**
Relocation of UKPN Electricity post	Relocation of UKPN Electricity post	15													15
A120 - Bentley Road Bellmouth improvements	Junction improvements	6	21												21
Bentley Road Improvements	Bentley Road Widening - Section 1 + Cycle Track	12													12
	Bentley Road Widening - Section 2 + Cycle Track		12	21	21										54
	Bentley Road Widening - Section 3 + Cycle Track	12	12												24
	Bentley Road Widening - Section 4 + Cycle Track		12	12											24
	Bentley Road/ Cable Corridor Haul Road Bellmouth (Southern Bellmouth, West side of Bentley Road)				9										9
	Installation of Bellmouth (South of Ardleigh Road connecting to new Haul Road)					21									21
	Installation of Bellmouth (North of Ardleigh Road connecting to substation Access Road)						21								21
Ardleigh Road Improvements	Widening - Section 5 (Between Bellmouth and Ardleigh Road Diversion)						9	21	21						51
	Installation of Bellmouth and Diversion Route									21	21				42
	Ardleigh Road Junction Improvements										6				6
New Haul Road	Installation of new Haul Road											21	21	21	63
	Installation of Bellmouth (Connection for Haul road to Bentley Road)													9	9
Vegetation clearance, Utility diversions between cable route hall road bellmouths and new haul road	Vegetation clearance, Utility diversions between cable route hall road bellmouths and new haul road												6	6	12
	Total average persons on site	45	57	33	30	21	30	21	21	21	27	21	21	30	
	Total labour days per month (Assuming 24 working days per Month)	1080	1368	792	720	504	720	504	504	504	648	504	504	720	

Figure 2.5 presents an estimated overview of the employment levels expected during each phase of the access construction.

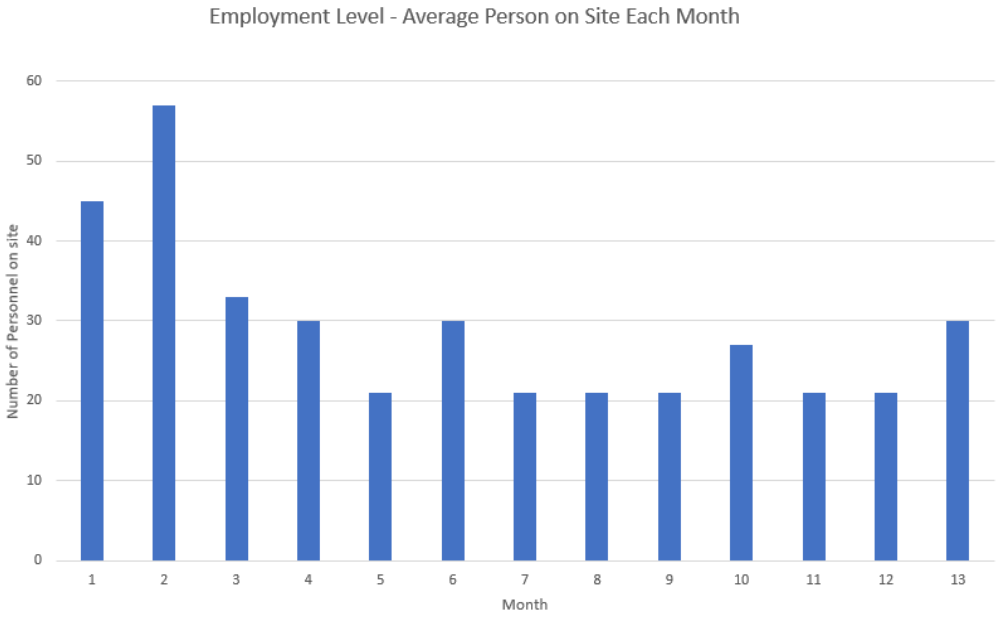
Figure 2.5: Employment levels per activity Option 2 and Option 3



Source: MML

Figure 2.6 presents an estimated overview of the employment levels each month through the duration of the access construction.

Figure 2.6: Employment levels per month Option 2 and Option 3



Source: MML

2.4 HGV Movements

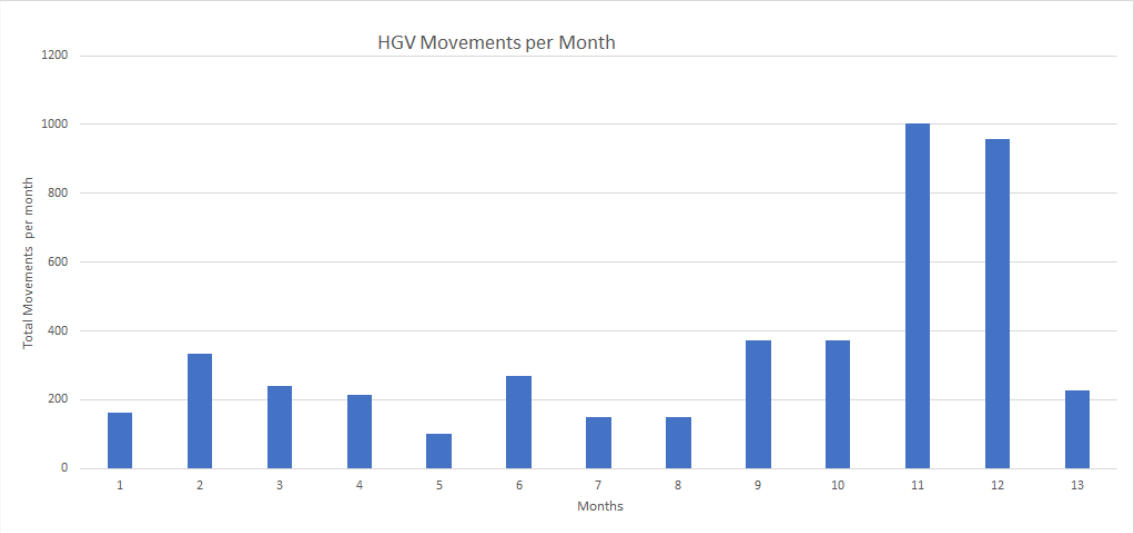
2.4.1 Option 1 HGV movements

Table 2.5 and Figure 2.7 show the number HGV movements for each activity throughout the construction of Option 1. Please note, the movements shown are two-way movements.

Table 2.5: HGV movements For Option 1

			Months													
Phase	**Activity**	**Movements per month**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**Total**
A120 - Bentley Road Bellmouth improvements	Junction improvements	45	45	45												90
Bentley Road Improvements	Bentley Road Widening - Section 1	68	68													68
	Bentley Road Widening - Section 2	130		130	130	130										390
	Bentley Road Widening - Section 3	48	48	48												144
	Bentley Road Widening - Section 4	111		111	111											111
	Bentley Road/ Cable Corridor Haul Road Bellmouth (Southern Bellmouth, West side of Bentley Road)	84				84										84
	Installation of Bellmouth (South of Ardleigh Road connecting to new Haul Road)	100					100									100
	Installation of Bellmouth (North of Ardleigh Road connecting to substation Access Road)	119						119								119
Ardleigh Road Improvements	Widening - Section 5 (Between Bellmouth and Ardleigh Road Diversion)	149						149	149	149						447
	Installation of Bellmouth and Diversion Route	373									373	373				746
	Ardleigh Road Junction Improvements	45											45			46
New Haul Road	Installation of new Haul Road (assumed to be completed via access from the cable haul road)	958											958	958	958	2874
	Installation of Bellmouth (Connection for Haul Road to Bentley Road)	226													226	226
		Movements per month (excl. Haul Road)	161	334	241	214	100	268	149	149	373	373	1003	958	226	
		Maximum monthly vehicles (excl. Haul Road)	373													
		Average monthly vehicle (excl. Haul Road)	325													

Figure 2.7: HGV two way movements per month Option 1



Source: MML

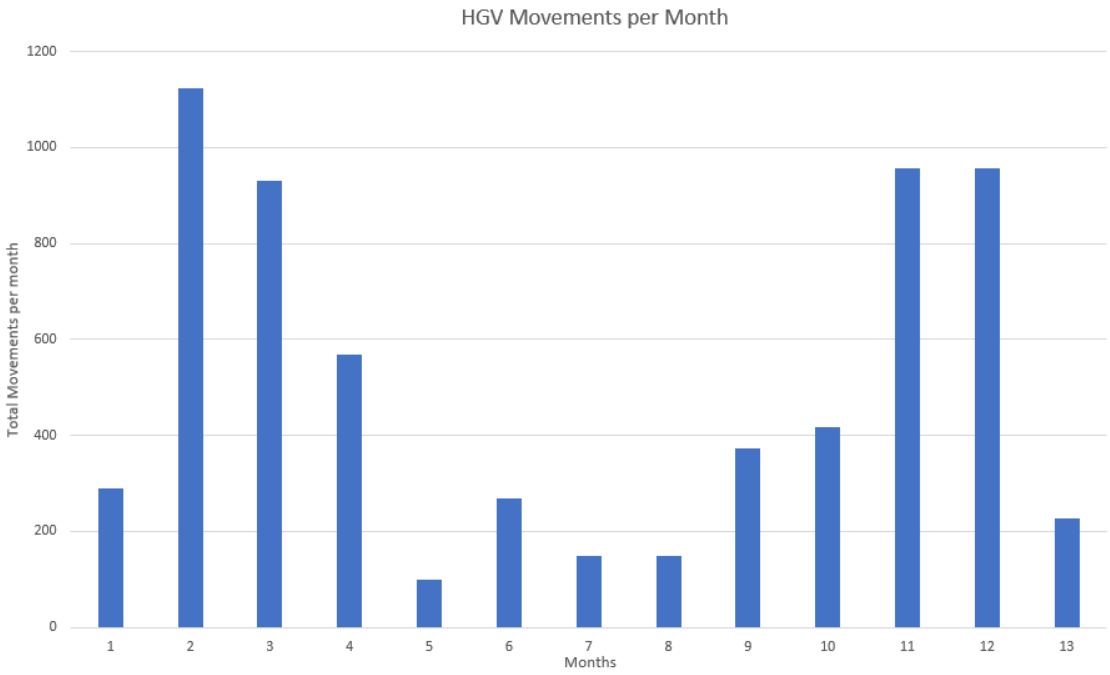
2.4.2 Option 2 HGV Movements

Table 2.6 and Figure 2.8 show the number HGV movements for each activity throughout the construction of option 2. Please note, the movements shown are two-way movements. The Haul Road has been shown for information as an estimate as this is outside the scope of this assessment and is excluded from total, maximum and average values provided.

Table 2.6: HGV movements For Option 2

			Months													
Phase	**Activity**	**Movements per month**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**Total**
A120 - Bentley Road Bellmouth improvements	Junction Improvements + cycle track	73	73	73												146
Bentley Road Improvements	Bentley Road Widening + cycle track - Section 1	100	100													100
	Bentley Road Widening + cycle track - Section 2	484		484	484	484										1452
	Bentley Road Widening + cycle track - Section 3	118	118	118												236
	Bentley Road Widening + cycle track - Section 4	448		448	448											896
	Bentley Road/ Cable Corridor Haul Road Bellmouth (Southern Bellmouth, West side of Bentley Road)	84				84										84
	Installation of Bellmouth (South of Ardleigh Road connecting to new Haul Road)	100					100									100
	Installation of Bellmouth (North of Ardleigh Road connecting to substation Access Road)	119						119								119
Ardleigh Road Improvements	Widening - Section 5 (Between Bellmouth and Ardleigh Road Diversion)	149						149	149	149						447
	Installation of Bellmouth and Diversion Route	373									373	373				746
	Ardleigh Road Junction Improvements	45										45				45
New Haul Road	Installation of new Haul Road (assumed to be completed via access from the cable haul road)	958											958	958	958	2874
	Installation of Bellmouth (Connection for Haul Road to Bentley Road)	226													226	226
		Movements per month (excl. Haul Road)	291	1123	932	568	100	268	149	149	373	418	958	958	226	
		Maximum monthly vehicles (excl. Haul Road)	1123													
		Average monthly vehicle (excl. Haul Road)	465													

Figure 2.8: HGV two way movements per Month Option 2



Source: MML

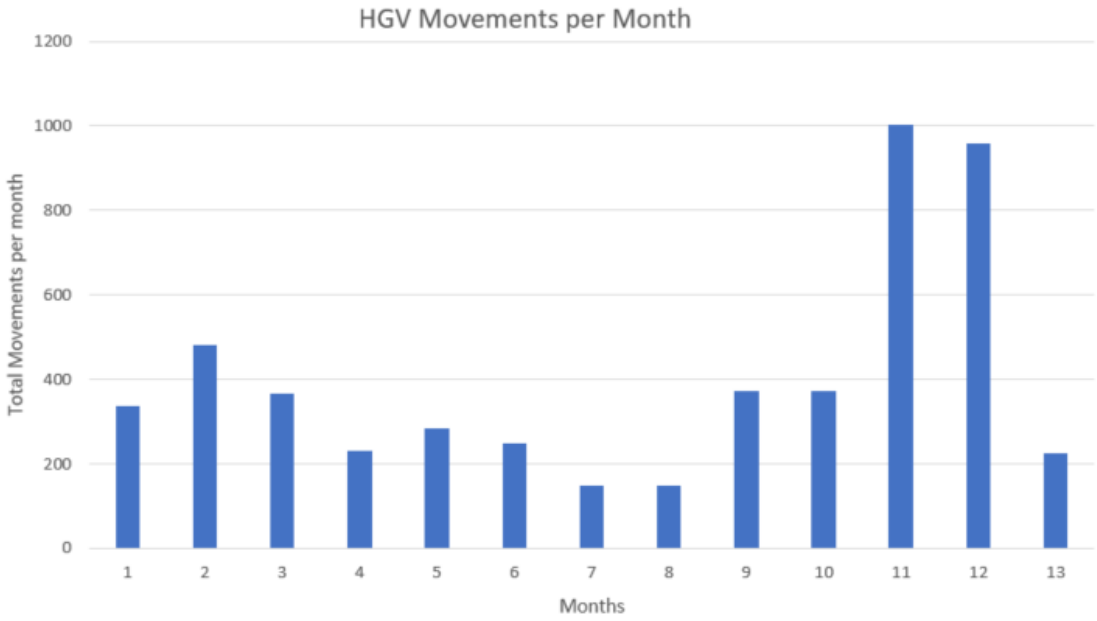
2.4.3 Option 3 HGV Movements

Table 2.7 and Figure 2.9 show the number HGV movements for each activity throughout the construction of option 3. Please note, the movements shown are two-way movements. The Haul Road has been shown for information as an estimate as this is outside the scope of this assessment and is excluded from total, maximum and average values provided.

Table 2.7 HGV Movements for Option 3

			Months													
Phase	**Activity**	**Movements per month**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**Total**
A120 - Bentley Road Bellmouth and Bentley Road Improvements	Junction Improvements and Section 1 widening + cycle track	113	113	113												226
	Bentley Road Widening - Section 2 + cycle track	143		143	143	143	143									572
	Bentley Road Widening - Section 3 and 4+ cycle track	220	220	220	220											660
	Installation of Bellmouth (Southern Bellmouth, West side of Bentley Road)	86				86										86
	Installation of Bellmouth (South of Ardleigh Road connecting to new Haul Road)	140					140									140
	Installation of Bellmouth (North of Ardleigh Road connecting to substation Access Road)	100						100								100
Ardleigh Road Improvements	Widening - Section 5 (Between Bellmouth and Ardleigh Road Diversion)	149						149	149	149						447
	Installation of Bellmouth and Diversion Route	373									373	373				746
	Ardleigh Road Junction Improvements	45											45			45
New Haul Road	Installation of new Haul Road (assumed to be completed via access from the cable haul road)	958											958	958	958	2874
	Installation of Bellmouth (Connection for Haul Road to Bentley Road)	226													226	226
		Movements per month (Excl. Haul Road)	333	467	363	229	283	249	149	149	373	373	1003	958	226	
		Maximum monthly vehicles (excl. Haul Road)	1003													
		Average monthly vehicle (excl. Haul Road)	369													

Figure 2.9: HGV two way movements per Month Option 3



Source: MML

Please note, all tables and figures within section 2 are based on the construction of the access works only. The vehicle movements for Option 1, Option 2 and Option 3 are shown as two-way movements. Refer to document 004885046 for further details.

The values for the cable corridor haul road HGV movements were not included in the average monthly vehicle movement value calculated in Table 2.5, Table 2.6 and Table 2.7. The cable corridor haul road construction is outside of the project scope therefore, HGV movements for that road were not calculated.

2.5 Working hours requirements

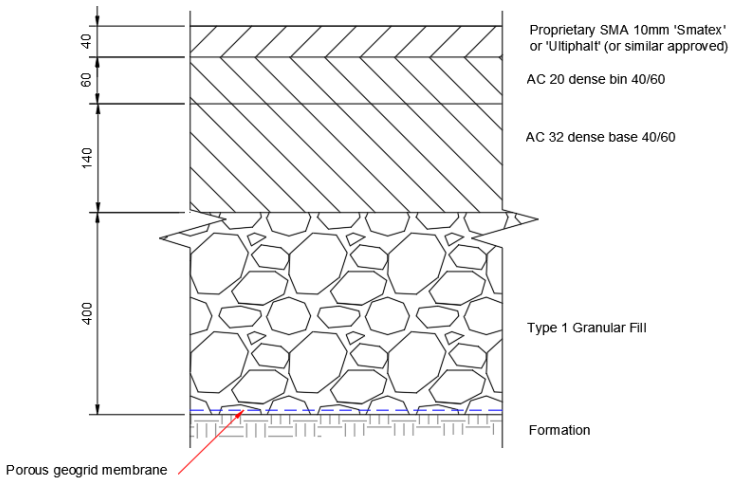
Construction working hours will have to be agreed with the Local Authority, with necessary permit/authorisations gained for the construction work to commence. Typically, construction activities will be daytime only 07:00 to 19:00 from Monday to Friday and 07:00 to 13:00 on Saturdays, with no work where noise is audible beyond the site boundary on Sundays, Bank Holidays or in the night-time. Certain “time critical activities” would occur outside these hours. Any requirement to work outside of these normal hours would occur with prior agreement with the Local Authorities.

3 Construction parameters

3.1 Road make-up

Figure 3.1 shows the road make up that has been assumed for all widening sections and the new AIL haul road. The AIL haul road has been assumed to be a permanent road to give the worst case for excavated materials, waste materials and vehicle movements.

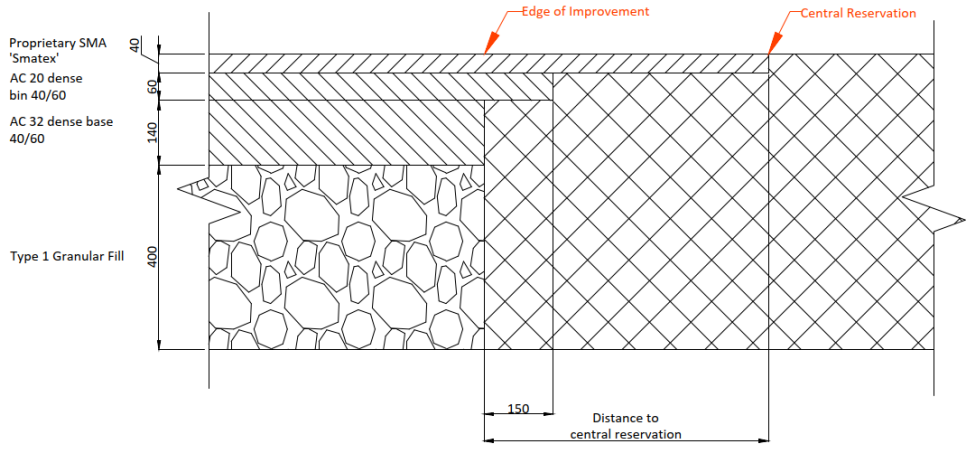
Figure 3.1: Road make-up section



Source: MML

Figure 3.2 shows the tie in detail for the widening sections for Option 1 and Option 3. The surface course will extend to the central reservation. The binder course will extend 150mm beyond the improvement area. The subbase and the base layer will only cover the area of widening.

Figure 3.2: Tie in details for road widening – Option 1 and Option 3



Source: MML

The tie-in specifications differ for road sections featuring cycle tracks, with variations dependent upon whether the road expansion for the cycle track occurs on the western or eastern side of the pre-existing road, as shown in drawing 004921122.

3.2 Imported equipment and materials

Assumptions:

- It was assumed that the proprietary SMA surface layer was installed to the central reservation of the existing roads as seen in Figure 3.2 and drawing 004921122.
- It was assumed that the AC 20 layer was installed 0.15m into the existing road for road widening sections as seen in Figure 3.2.
- A 15% contingency and a 30% compaction factor has been added to the imported engineered fill whilst all other quantities are subject to a contingency weighting of between 15% and 20%, with no compaction factor.
- It was assumed that 9m^3 tipper lorries carried the proprietary SMA, AC20, AC32 and waste. Whereas it was assumed that 20T tipper lorries carried the type 1 granular fill. It was also assumed that the lorries were carrying at full capacity for the vehicle movement calculations.
- It was assumed 25m of road was built per day for the New Haul Road between Bentley and Ardleigh Road as it was assumed it shall be a permanent road.
- It was assumed 50m of road was built per day for the new cable corridor haul road as it was assumed it shall be a temporary road.

Table 3.1 provides an indicative forecast for the material imports expected for the works of Option 1. Refer to document 004885046 for further details.

Table 3.1: Imported materials – Bentley Road – Option 1

Activity	Approximate Quantity*		Vehicle Type	2 Way Vehicle Movements
Civils Main Works				
A120- Bentley Road Junction improvements				
Proprietary SMA	29	m^3	9m^3 tipper lorries	7
AC 20	17	m^3	9m^3 tipper lorries	4
AC 32	35	m^3	9m^3 tipper lorries	8
Type 1 Granular fill	99	m^3	20t Rigid tipper lorry	30
Bentley Road Widening- Section 1				
Proprietary SMA	20	m^3	9m^3 tipper lorries	5
AC 20	13	m^3	9m^3 tipper lorries	3
AC 32	27	m^3	9m^3 tipper lorries	6
Type 1 Granular fill	78	m^3	20t Rigid tipper lorry	24
Bentley Road Widening- Section 2				
Proprietary SMA	113	m^3	9m^3 tipper lorries	26
AC 20	72	m^3	9m^3 tipper lorries	16
AC 32	154	m^3	9m^3 tipper lorries	35
Type 1 Granular fill	440	m^3	20t Rigid tipper lorry	132

Activity	Approximate Quantity*		Vehicle Type	2 Way Vehicle Movements
Bentley Road Widening- Section 3				
Proprietary SMA	35	m^3	$9m^3$ tipper lorries	8
AC 20	18	m^3	$9m^3$ tipper lorries	4
AC 32	36	m^3	$9m^3$ tipper lorries	8
Type 1 Granular fill	103	m^3	20t Rigid tipper lorry	31
Bentley Road Widening- Section 4				
Proprietary SMA	67	m^3	$9m^3$ tipper lorries	15
AC 20	42	m^3	$9m^3$ tipper lorries	10
AC 32	88	m^3	$9m^3$ tipper lorries	20
Type 1 Granular fill	250	m^3	20t Rigid tipper lorry	75
Cable Corridor Haul Road Bellmouth (Northwest side of Bentley Road)				
Proprietary SMA	11	m^3	$9m^3$ tipper lorries	3
AC 20	17	m^3	$9m^3$ tipper lorries	4
AC 32	38	m^3	$9m^3$ tipper lorries	9
Type 1 Granular fill	107	m^3	20t Rigid tipper lorry	32
Cable Corridor Haul Road Bellmouth (Southwest side of Bentley Road)				
Proprietary SMA	11	m^3	$9m^3$ tipper lorries	3
AC 20	16	m^3	$9m^3$ tipper lorries	4
AC 32	37	m^3	$9m^3$ tipper lorries	9
Type 1 Granular fill	104	m^3	20t Rigid tipper lorry	32
Cable Corridor Haul Road Bellmouth (East side of Bentley Road)				
Proprietary SMA	11	m^3	$9m^3$ tipper lorries	3
AC 20	16	m^3	$9m^3$ tipper lorries	4
AC 32	38	m^3	$9m^3$ tipper lorries	9
Type 1 Granular fill	107	m^3	20t Rigid tipper lorry	32
Total Bentley Road Quantities				
Proprietary SMA	294	m^3	$9m^3$ tipper lorries	70
AC 20	208	m^3	$9m^3$ tipper lorries	49
AC 32	450	m^3	$9m^3$ tipper lorries	104
Type 1 Granular fill	1285	m^3	20t Rigid tipper lorry	388

**All quantities are subject to a contingency weighting of 15%. A 30% compaction factor has been added to the imported engineered fill.*

Table 3.2 provides an indicative forecast for the material imports expected for the works of Option 2, including the cycle track. Refer to document 004885046 for further details.

Table 3.2: Imported material Bentley Road - Option 2

Activity	Approximate Quantity*		Vehicle Type	2 Way Vehicle Movements
Civils Main Works				
A120- Bentley Road Junction improvements				
Proprietary SMA	29	m^3	$9m^3$ tipper lorries	7
AC 6	9	m^3	$9m^3$ tipper lorries	2
AC 20	39	m^3	$9m^3$ tipper lorries	9
AC 32	35	m^3	$9m^3$ tipper lorries	8
Type 1 Granular fill	179	m^3	20t Rigid tipper lorry	54
Bentley Road Widening- Section 1 and cycle track				
Proprietary SMA	16	m^3	$9m^3$ tipper lorries	4
AC 6	8	m^3	$9m^3$ tipper lorries	2
AC 20	25	m^3	$9m^3$ tipper lorries	6
AC 32	17	m^3	$9m^3$ tipper lorries	4
Type 1 Granular fill	131	m^3	20t Rigid tipper lorry	40
Bentley Road Widening- Section 2 and cycle track				
Proprietary SMA	223	m^3	$9m^3$ tipper lorries	50
AC 20	328	m^3	$9m^3$ tipper lorries	73
AC 32	751	m^3	$9m^3$ tipper lorries	167
Type 1 Granular fill	1622	m^3	20t Rigid tipper lorry	485
Bentley Road Widening- Section 3 and cycle track				
Proprietary SMA	12	m^3	$9m^3$ tipper lorries	3
AC 6	17	m^3	$9m^3$ tipper lorries	4
AC 20	60	m^3	$9m^3$ tipper lorries	14
AC 32	41	m^3	$9m^3$ tipper lorries	9
Type 1 Granular fill	312	m^3	20t Rigid tipper lorry	94
Bentley Road Widening- Section 4 and cycle track				
Proprietary SMA	138	m^3	$9m^3$ tipper lorries	31
AC 20	203	m^3	$9m^3$ tipper lorries	45
AC 32	464	m^3	$9m^3$ tipper lorries	103
Type 1 Granular fill	1001	m^3	20t Rigid tipper lorry	300
Cable Corridor Haul Road Bellmouth (Northwest side of Bentley Road)				
Proprietary SMA	11	m^3	$9m^3$ tipper lorries	3
AC 20	17	m^3	$9m^3$ tipper lorries	4
AC 32	38	m^3	$9m^3$ tipper lorries	9
Type 1 Granular fill	107	m^3	20t Rigid tipper lorry	32
Cable Corridor Haul Road Bellmouth (Southwest side of Bentley Road)				

Activity	Approximate Quantity*		Vehicle Type	2 Way Vehicle Movements
Proprietary SMA	11	m^3	$9m^3$ tipper lorries	3
AC 20	16	m^3	$9m^3$ tipper lorries	4
AC 32	37	m^3	$9m^3$ tipper lorries	9
Type 1 Granular fill	104	m^3	20t Rigid tipper lorry	32
Cable Corridor Haul Road Bellmouth (East side of Bentley Road) +cycle track				
Proprietary SMA	11	m^3	$9m^3$ tipper lorries	3
AC 6	8	m^3	$9m^3$ tipper lorries	2
AC 20	35	m^3	$9m^3$ tipper lorries	4
AC 32	38	m^3	$9m^3$ tipper lorries	9
Type 1 Granular fill	185	m^3	20t Rigid tipper lorry	56
Total Bentley Road Quantities				
Proprietary SMA	437	m^3	$9m^3$ tipper lorries	102
AC 6	41	m^3	$9m^3$ tipper lorries	10
AC 20	720	m^3	$9m^3$ tipper lorries	163
AC 32	1417	m^3	$9m^3$ tipper lorries	318
Type 1 Granular fill	3641	m^3	20t Rigid tipper lorry	1093

**All quantities are subject to a contingency weighting of 15%. A 30% compaction factor has been added to the imported engineered fill.*

Table 3.3 provides an indicative forecast for the material imports expected for the works of Option 3, including the cycle track. Refer to document 004885046 for further details.

Table 3.3: Imported material Bentley Road - Option 3

Activity	Approximate Quantity*		Vehicle Type	2 Way Vehicle Movements
Civils Main Works				
A120 - Bentley road widening + Section 1 Bentley Road widening and cycle track				
Proprietary SMA	47	m^3	$9m^3$ tipper lorries	11
AC 6	16	m^3	$9m^3$ tipper lorries	4
AC 20	64	m^3	$9m^3$ tipper lorries	15
AC 32	53	m^3	$9m^3$ tipper lorries	12
Type 1 Granular fill	354	m^3	20t Rigid tipper lorry	82
Bentley Road Widening- Section 2 and cycle track				
Proprietary SMA	112	m^3	$9m^3$ tipper lorries	25
AC 6	41	m^3	$9m^3$ tipper lorries	10
AC 20	164	m^3	$9m^3$ tipper lorries	37
AC 32	130	m^3	$9m^3$ tipper lorries	29
Type 1 Granular fill	905	m^3	20t Rigid tipper lorry	209
Bentley Road Widening- Section 3 & 4 and cycle track				

Activity	Approximate Quantity*		Vehicle Type	2 Way Vehicle Movements
Proprietary SMA	101	m^3	9m^3 tipper lorries	23
AC 6	66	m^3	9m^3 tipper lorries	15
AC 20	215	m^3	9m^3 tipper lorries	48
AC 32	105	m^3	9m^3 tipper lorries	24
Type 1 Granular fill	1071	m^3	20t Rigid tipper lorry	247
Cable Corridor Haul Road Bellmouth (Northwest side of Bentley Road)				
Proprietary SMA	11	m^3	9m^3 tipper lorries	3
AC 20	17	m^3	9m^3 tipper lorries	4
AC 32	38	m^3	9m^3 tipper lorries	9
Type 1 Granular fill	107	m^3	20t Rigid tipper lorry	32
Cable Corridor Haul Road Bellmouth (Southwest side of Bentley Road)				
Proprietary SMA	11	m^3	9m^3 tipper lorries	3
AC 20	16	m^3	9m^3 tipper lorries	4
AC 32	37	m^3	9m^3 tipper lorries	9
Type 1 Granular fill	104	m^3	20t Rigid tipper lorry	32
Cable Corridor Haul Road Bellmouth (East side of Bentley Road)				
Proprietary SMA	11	m^3	9m^3 tipper lorries	3
AC 20	16	m^3	9m^3 tipper lorries	4
AC 32	38	m^3	9m^3 tipper lorries	9
Type 1 Granular fill	107	m^3	20t Rigid tipper lorry	32
Total Bentley Road Quantities				
Proprietary SMA	293	m^3	9m^3 tipper lorries	68
AC6	123	m^3	9m^3 tipper lorries	29
AC 20	492	m^3	9m^3 tipper lorries	112
AC 32	401	m^3	9m^3 tipper lorries	92
Type 1 Granular fill	2648	m^3	20t Rigid tipper lorry	634

**All quantities are subject to a contingency weighting of 15%. A 30% compaction factor has been added to the imported engineered fill.*

Table 3.4 provides an indicative estimate for the equipment and materials expected for the Ardleigh Road and AIL Haul Road works. These quantities guided the HGV traffic movements shown in Table 2.5, Table 2.6 and Table 2.7. Refer to document 004885046 for further details.

Table 3.4: Imported materials – Ardleigh & New Haul Road - Option 1, 2 and 3

Activity	Approximate Quantity*		Vehicle Type	2 Way Vehicle Movements
Civils Main Works				
Installation of Bellmouth (South of Ardleigh Road Connecting to Cable Corridor Haul Road				
Proprietary SMA	13	m^3	9m^3 tipper lorries	3

Activity	Approximate Quantity*		Vehicle Type	2 Way Vehicle Movements
AC 20	19	m^3	$9m^3$ tipper lorries	5
AC 32	44	m^3	$9m^3$ tipper lorries	10
Type 1 Granular fill	125	m^3	20t Rigid tipper lorry	38
Installation of Bellmouth (North of Ardleigh Road connecting to substation Access Road				
Proprietary SMA	13	m^3	$9m^3$ tipper lorries	3
AC 20	19	m^3	$9m^3$ tipper lorries	5
AC 32	44	m^3	$9m^3$ tipper lorries	10
Type 1 Granular fill	125	m^3	20t Rigid tipper lorry	38
Ardleigh Road widening section 5 (Between Bellmouth and Ardleigh Road Diversion)				
Proprietary SMA	84	m^3	$9m^3$ tipper lorries	19
AC 20	85	m^3	$9m^3$ tipper lorries	19
AC 32	188	m^3	$9m^3$ tipper lorries	42
Type 1 Granular fill	536	m^3	20t Rigid tipper lorry	161
Ardleigh Road Installation of Bellmouth and Diversion Route				
Proprietary SMA	93	m^3	$9m^3$ tipper lorries	21
AC 20	140	m^3	$9m^3$ tipper lorries	31
AC 32	325	m^3	$9m^3$ tipper lorries	73
Type 1 Granular fill	929	m^3	20t Rigid tipper lorry	278
Ardleigh Road Junction Improvement				
Proprietary SMA	10	m^3	$9m^3$ tipper lorries	3
AC 20	9	m^3	$9m^3$ tipper lorries	2
AC 32	19	m^3	$9m^3$ tipper lorries	5
Type 1 Granular fill	52	m^3	20t Rigid tipper lorry	16
Installation of New Haul Road				
Proprietary SMA	358	m^3	$9m^3$ tipper lorries	80
AC 20	537	m^3	$9m^3$ tipper lorries	120
AC 32	1251	m^3	$9m^3$ tipper lorries	278
Type 1 Granular fill	3575	m^3	20t Rigid tipper lorry	1069
Installation of Bellmouth (Connection for Haul Road to Bentley Road)				
Proprietary SMA	28	m^3	$9m^3$ tipper lorries	7
AC 20	42	m^3	$9m^3$ tipper lorries	10
AC 32	99	m^3	$9m^3$ tipper lorries	22
Type 1 Granular fill	281	m^3	20t Rigid tipper lorry	84
Total of Ardleigh & New Haul Road				
Proprietary SMA	600	m^3	$9m^3$ tipper lorries	137
AC 20	851	m^3	$9m^3$ tipper lorries	192
AC 32	1975	m^3	$9m^3$ tipper lorries	442

Activity	Approximate Quantity*		Vehicle Type	2 Way Vehicle Movements
Type 1 Granular fill	5643	m^3	20t Rigid tipper lorry	1691

**All quantities are subject to a contingency weighting of 15%. A 30% compaction factor has been added to the imported engineered fill.*

3.3 Noise Levels during Construction

The utilisation of noise-emitting construction plant items and the corresponding noise emission levels are shown in Table 3.5. The information presented below is preliminary and will be confirmed and developed at a later stage once the Construction Environmental Management Plan (CEMP) is produced.

Table 3.5: Construction plant used for noise assessment

Construction Phase	Plant Description	Sound Power Level dB(A) (1)	No. of Plant (3)	Utilisation % on-time
Access road and car parking works road works	Excavator	102	2	100
	Dump truck	105	4	70
	Asphalt spreader with support lorry	106	1	100
	Vibratory roller	106	2	70
	Grader	112	1	100
	Lorry	103	3	25
	MEWP	78	2	75
	Generator(2)	100	2	100
	Crusher	116	2	80

Source: BS 5228-1:2009, Appendix D: Historic sound level data on site equipment and site activities.

Notes: (1) Guide to the sound power levels for stationary and quasi-stationary site equipment.
(2) General use plant to be used during different construction phases.
(3) Each no of plant assumed per phase of work.

3.4 Site Waste

Site waste shall be managed in a structured and auditable manner and in accordance with agreed site and waste management plan (SWMP) from the commencement of the project during the detailed design stage and through construction. This ensures that the aim of waste minimisation is emphasised from the outset. In addition, it will ensure that the waste produced during the construction phase is dealt with in accordance with the relevant requirements of UK legislation, as well as any other requirements specified by the relevant regulatory authorities.

The following main activities that will lead to waste being generated have been identified:

- Wastes arising from excavation.
- Wastes arising from existing road tie in as drawing 004921122.
- Wastes arising from vegetation clearance.

A waste management storage area is designated as part of the compound to facilitate the segregation of waste. This area will be delineated and separated from where new material is stored with recycling and waste bins kept clean and clearly marked in order to avoid cross-contamination of materials.

Waste carriers and the disposal sites will need to be identified.

3.4.1 Waste quantities

Table 3.6, *All *quantities are subject to a contingency weighting of 20%.*

Table 3.7, *All *quantities are subject to a contingency weighting of 20%.*

Table 3.7 and Table 3.9 sets out the predicted waste arisings and management of options. This will be updated as the project progresses. Ardleigh & New Haul Waste Quantities are the same for all options, 1, 2 and 3.

Table 3.6: Predicted waste arisings and management options – Bentley Road option 1

Waste Material	Predicted Volume (m^3)*	2 Way Vehicle Movement
Excavation		
A120- Bentley Road Junction improvements	22 Existing Road waste 166 Topsoil/ Subsoil	42
Bentley Road Widening - Section 1	14 Existing Road waste 129 Topsoil/ Subsoil	32
Bentley Road Widening - Section 2	78 Existing Road waste 734 Topsoil/ Subsoil	181
Bentley Road Widening - Section 3	28 Existing Road waste 171 Topsoil/ Subsoil	45
Bentley Road Widening - Section 4	47 Existing Road waste 418Topsoil/Subsoil	104
Bentley Road - Cable Corridor Haul Road Bellmouth (Northern Bellmouth, West side of Bentley Road)	179 Topsoil/ Subsoil	40
Bentley Road - Cable Corridor Haul Road Bellmouth (Southern Bellmouth, West side of Bentley Road)	174 Topsoil/ Subsoil	39
Bentley Road - Cable Corridor Haul Road Bellmouth East side of Bentley Road)	178 Topsoil/ Subsoil	40
TOTAL	188 Existing Road waste 2146 Topsoil/ Subsoil	523

**All quantities are subject to a contingency weighting of 20%.*

Table 3.7: Predicted waste arisings and management options – Bentley Road option 2

Waste Material	Predicted Volume (m^3)*	2 Way Vehicle Movement
Excavation		
A120- Bentley Road Junction improvements + cycle track	22 Existing Road waste 282 Topsoil/ Subsoil	68
Bentley Road Widening - Section 1 with cycle track	206 Topsoil/ Subsoil	46

Waste Material	Predicted Volume (m^3)*	2 Way Vehicle Movement
Bentley Road Widening - Section 2 with cycle track	587 Existing Road waste 2463 Topsoil/ Subsoil	678
Bentley Road Widening - Section 3 with cycle track	485 Topsoil/ Subsoil	108
Bentley Road Widening - Section 4 with cycle track	314 Existing Road waste 1521 Topsoil/Subsoil	419
Bentley Road - Cable Corridor Haul Road Bellmouth (Northern Bellmouth, West side of Bentley Road)	179 Topsoil/ Subsoil	40
Bentley Road - Cable Corridor Haul Road Bellmouth (Southern Bellmouth, West side of Bentley Road)	174 Topsoil/ Subsoil	39
Bentley Road - Cable Corridor Haul Road Bellmouth East side of Bentley Road) + Cycle Track	287 Topsoil/ Subsoil	64
TOTAL	923 Existing Road waste 5391 Topsoil/ Subsoil	1462

**All quantities are subject to a contingency weighting of 20%.*

Table 3.8: Predicted waste arisings and management options – Bentley Road option 3

Waste Material	Predicted Volume (m^3)*	2 Way Vehicle Movement
Excavation		
A120- Bentley Road Junction improvements + Section 1 Bentley Road Widening with cycle track	37 Existing Road waste 433 Topsoil/ Subsoil	105
Bentley Road Widening - Section 2 with cycle track	84 Existing Road waste 1107 Topsoil/ Subsoil	265
Bentley Road Widening - Section 3 and 4 with cycle track	80 Existing Road waste 1286 Topsoil/ Subsoil	304
Bentley Road - Cable Corridor Haul Road Bellmouth (Northern Bellmouth, West side of Bentley Road)	179 Topsoil/ Subsoil	40
Bentley Road - Cable Corridor Haul Road Bellmouth (Southern Bellmouth, West side of Bentley Road)	174 Topsoil/ Subsoil	39
Bentley Road - Cable Corridor Haul Road Bellmouth East side of Bentley Road)	178 Topsoil/ Subsoil	40
TOTAL	201 Existing Road waste 3357 Topsoil/ Subsoil	793

**All quantities are subject to a contingency weighting of 20%.*

Table 3.9: Predicted waste arisings and management options – Ardleigh & New Haul Road Option 1, Option 2 and Option 3

Waste Material	Predicted Volume (m^3)*	2 Way Vehicle Movement
Excavation		
Installation of Bellmouth (South of Ardleigh Road connecting to new Haul Road)	208 Topsoil/ Subsoil	47
Installation of Bellmouth (North of Ardleigh Road connecting to substation Access Road)	247 Topsoil/ Subsoil	55
Ardleigh Road Widening - Section 5 (Between Bellmouth and Ardleigh Road Diversion)	36 Existing Road waste 895Topsoil/ Subsoil	207
Installation of Bellmouth and Diversion Route	1551 Topsoil/ Subsoil	345
Ardleigh Road Junction Improvements	6 Existing Road waste 87 Topsoil/ Subsoil	21
Installation of new AIL Haul Road	5968 Topsoil/ Subsoil	1327
Installation of Bellmouth (Connection for Haul Road to Bentley Road)	469 Topsoil/ Subsoil	105
TOTAL	41 Existing Road waste 9421 Topsoil/ Subsoil	2107

**All quantities are subject to a contingency weighting of 20%.*

4 Operational parameters

4.1 Site setting

The proposed road works comprise of:

- The A120-Bentley Road Junction area of proposed widening is 215m^2 for option 1 and 3. For option 2, the buffer zone has an area of 76m^{2,} and the cycle track has an area of 297m^2.
- The total area of road widening for Bentley Road is equal to 1889m^2 for option 1. For option 2, the total area for the safety buffer and cycle track along Bentley Road is 4930m^2.
- For option 3, the total area of improvements to the A120 junction and Bentley Road is 1595m^2. The total area of cycle track in 5261m^2.
- There are 3 bellmouths connecting Bentley Road to the Cable Corridor Haul Road with their area totalling 689m^2. For Option 2, the safety buffer and cycle track at the bellmouth on the east side of Bentley Road have an area of 326m^2.
- The bellmouth connecting the New Haul Road to Bentley Road has a total area of 609.6m^2
- The New Haul Road has a total area of 7769.9m^2.
- The installation of the bellmouth and diversion route on Ardleigh road has an area of 2018.5m^2
- The bellmouths connecting to Ardleigh road from the cable corridor haul road and the substation access road have a total area of 590m^2.
- Ardleigh road junction improvements have a proposed area of 113.2m^2.
- The total area of the Ardleigh Road widening section between the bellmouths and Ardleigh Road diversion is equal to 1164.5m^2.

Appendix W A120/ Bentley Road Junction Road Improvements Technical Note

Volume 6, Part 6, Annex 8.1 Transport Assessment (Onshore)

Five Estuaries Offshore Wind Farm

Five Estuaries Wind Farm Ltd

SLR Project No.: 404.V05356.00010

23 September 2024

Contractor Coversheet

Project Name:	FE_NF_Mott Macdonald Co-Located Substation Studies	**Package No:**	PROJECTCODE 12 - Electrical Systems

Document Title:	Co-located Substations Early Design - A120 - Bentley Road Junction Improvements Technical Note
Classification:	Confidential

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Reason for Issue	Review		

MOTT MACDONALD

Co-Located Substation Early Design
A120 - Bentley Road Junction Road Improvements

Technical Note

December 2023

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Mott MacDonald
Victory House
Trafalgar Place
Brighton BN1 4FY
United Kingdom

T +44 (0)1273 365000
mottmac.com

Co-Located Substation Early Design
A120 - Bentley Road Junction Road Improvements

Technical Note

December 2023

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
P01	05/04/23	J Weeks	EJ v Iwaarden	M Barton	First Issue
P02	19/04/23	J Weeks	EJ v Iwaarden	M Barton	Update following receipt of traffic data
P03	07/12/23	Sonia A. Pedrosa	John Weeks	Andrea F. Crespo	Updated to capture latest Project decisions and addressed comments

Document reference: | P03 | 104560-MMD-00-XX-DR-CE-1029

Information class: Standard

Contents

1 Introduction

1.1 Background

RWE Renewables have procured Mott MacDonald to review the potential for a collocated substation site to accommodate the onshore substations for the Five Estuaries and North Falls Windfarms.

The scope is to develop the design of a co-located substation adjacent to a National Grid proposed substation site between Ardleigh and Little Bromley in Essex, for both North Falls (NF) and Five Estuaries (VE) Windfarms. The operational footprint of the co-located substations shall stay within CO01(See Figure 1.0 below). NF13 may be proposed for Temporary Construction Compounds (TCCs) if needed.

Figure 1.0: Proposed collocated substation site area

To enable the construction of the proposed collocated substations, temporary access from the local road network will be required for construction vehicles.

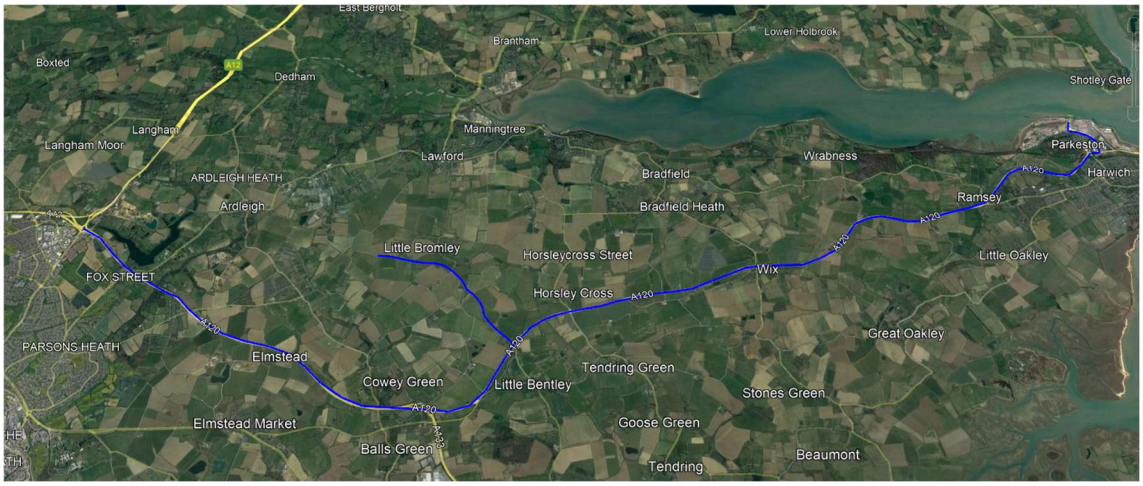


Figure 2.0: Proposed collocated substation construction access.

The proposed construction access is shown in Figure 2.0 and is a combination of local roads including the A120 and Bentley Road plus a section of new access road approximately 1.1km in length. Both North Falls (NF) and Five Estuaries (VE) Windfarms developers and third party developers will be using the same public roads to access their sites (apart from other particular roads and accesses that they will need to construct), therefore required works have been agreed to be split between the interested parties. Further details in Document 104560-MMD-00-XX-TN-VE-1038_P03, Section 1.2.

Construction traffic is predominately expected from the west via the A12, with Abnormal Indivisible Loads (AILs) being routed from the nearest port at Harwich.

Figure 3.0: AIL Movement

The AIL is likely to be one of the determining factors in terms of geometry of the access and the selection of local roads that will be suitable for routing to the site. A full assessment of the routing of AILs will be undertaken at detailed design stage where the vehicle sizes and suppliers can be identified. The selected haulage company will undertake the final assessment to identify any off-site street works that may be required. At this stage of the project a high-level assessment of the likely route for construction vehicles, including AILs, to reach the site has been undertaken identifying any potential areas where improvements may be required. Although the routing of AILs is a defining factor in the assessment, the number of movements is very low with the majority of construction traffic being in the form of normal HGVs, including 40T stone wagons, concrete mixers, mobile cranes, low loader plant deliveries and other delivery vehicles; plus smaller vans and cars servicing the site.

1.2 Focus of this report

This report focuses on the junction of the A120 with Bentley Road to identify any junction improvements that may be required and identify a works boundary at this location. The report will consider the following standards in relation to road geometry to assist in the development of any proposed works, whilst also considering the temporary nature of the works as part of a construction project and the future operational and maintenance needs of the proposed development.

Standards:

- National Highways - Design Manual for Roads and Bridges (DMRB)
- DfT - Manual for Streets
- HAUC – Safety at Street Works and Road Works (The Red Book)

Within this report Autodesk Vehicle Tracking software will be used to identify the likely swept path requirements for potential construction vehicles. The vehicles used are generic and may not reflect the vehicles ultimately used on site. The swept paths produced along with the geometric design standards will be used to determine and improvement works required at the junction.

2 Swept Path Analysis

Autodesk Vehicle Tracking software has been used to identify the likely swept path requirements for potential construction vehicles at the junction of the A120 and Bentley Road.

Figure 4.0 – A120 junction with Bentley Road

At the junction the A120 is a single lane dual carriageway with vehicle restraint systems (VRSs) along a central reservation separating the carriageways. A cycle and footway crossing is routed to cross the A120 north of the junction with a central refuge between the VRSs. The Bentley Road junction is a left in and left out junction only, vehicles heading west will need to travel to the A120/B1035 roundabout at Horsley Cross (approximately 1.4km east) to turn round.

Two scenarios have been assessed with swept path analysis, the first is an AIL vehicle turning into the junction from the east (from Harwich). The second scenario is the movement of two HGVs entering and exiting the junction at the same time.

A 74.72m long multiple axle girder frame transporter vehicle similar to that shown in Figure 3.0 has been used in scenario one, see Figure 5.0. Drawing 104560-MMD-00-XX-DR-CE-1026 shows the tracking proposed.

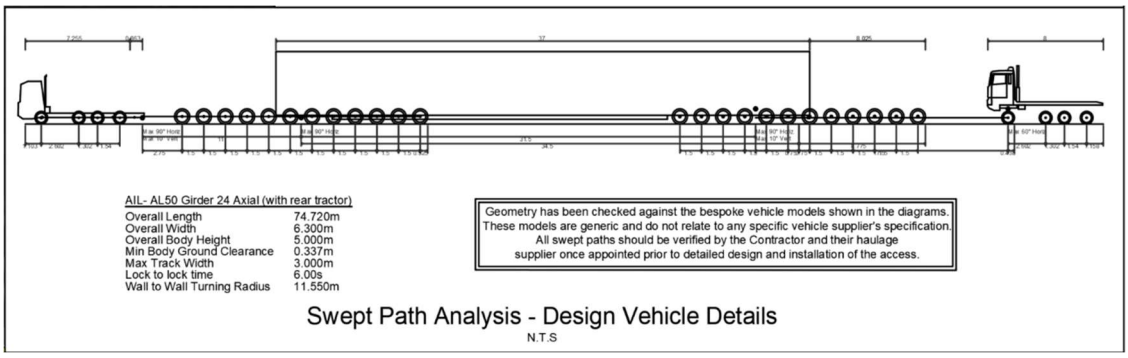


Figure 5.0 – AIL Model

The HGV model in Figure 6.0 has been used for scenario two. Drawing 104560-MMD-00-XX-DR-CE-1027 shows the tracking proposed.

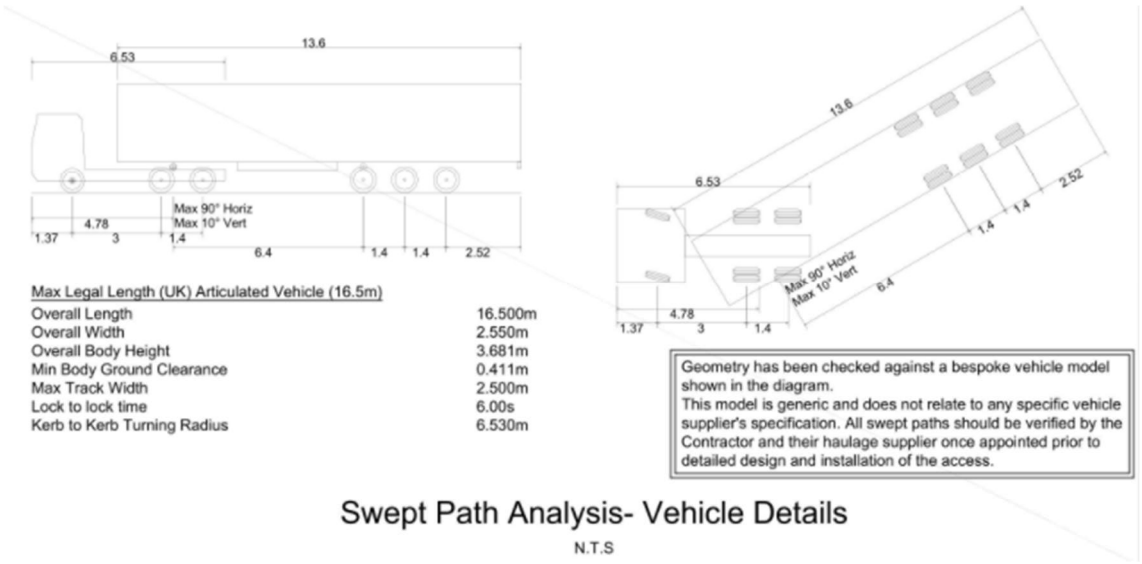


Figure 6.0 – HGV Model

3 Proposed works

3.1 This section of the assessment identifies the proposed junction improvement works required to facilitate the use of the junction as a construction access route for AIL vehicles.

Drawing 104560-MMD-00-XX-DR-CE-1026 shows the tracking of the AIL entering Bentley Road from the A120. The benefit of the tracking shown is that no significant widening or realignment of the junction is required to accommodate the AIL movement as it can be fully accommodated within the existing highways boundary. It should be noted that this drawing is based on OS mapping and aerial imagery and will need to be further assessed following surveys of the junction.

The tracking does require amendments to the central reservation where the vehicle restraint systems (VRS) and signage will need to be removed temporarily to accommodate the AIL movement. The vegetated areas of the central reserve will also need to be hardened temporarily or covered with trackway or similar for the movements.

Due to the removal of the VRS, mitigation for the cycle and footway crossing will be needed. This could be in the form of relocating the crossing further north away from the section of VRS being removed, an enforced reduction in the speed limit or the provision of temporary VRS that can be moved quickly prior to the AIL movement. During the AIL movement the cycle/footway would need to be closed.

3.2 This section of the assessment identifies the proposed junction improvement works required to facilitate the use of the junction as a construction access for two way HGV traffic.

Drawing 104560-MMD-00-XX-DR-CE-1027 shows the tracking proposed for the HGVs entering and exiting the junction. The tracking depicted shows that there is insufficient width along Bentley Road on the approach to the junction to accommodate the passing HGVs. Assessment of the available aerial imagery shows Bentley Road to be approximately 5.15m wide through this section. It should be noted that this drawing is based on OS mapping and aerial imagery and will need to be further assessed following surveys of the junction.

The tracking shows that widening of Bentley Road will be required through this section to accommodate the passing movement of the HGVs. Given the proximity to the junction and the limited visibility of vehicles turning into Bentley Road from the A120, it is considered unsuitable to rely on a passing place solution at this location. This assessment had initially focused on the junction including a 100m section of the approach to the junction along Bentley Road, however further assessments along Bentley Rd (summarized in document 104560-MMD-00-XX-TN-VE-1038) indicated the need to widen its length up to the junction with the temporary cable haul road to accommodate the two way HGVs trafficTherefore, the widening at this junction will be tying in with the widening along Bentley Rd as illustrated in drawings 104560-MMD-00-XX-DR-CE-1028 and 104560-MMD-00-XX-DR-CE-1031-1 to 3..

The DMRB ‘CD127 – Cross-sections and headrooms figure 2.1.1N1e’ shows carriageway widths for rural all purpose single carriageway roads as 7.3m, however it is not considered necessary to meet the requirements of the DMRB in this instance given the nature and use of Bentley Road. Manual for Streets clause 7.2.2 states that carriageway widths should be appropriate for the particular context and uses of the street and shows an illustrative single

carriageway arrangement with a width of 5.5m. The HAUC Red Book identifies 6.75m as a minimum for two way traffic. Both the HAUC guidance and Manuel for Streets identify a problem with lane widths between 2.75m and 3.25m, as this width encourages the unsafe overtaking of cyclists using the carriageway when there is no dedicated cycle infrastructure.

Given the cycle crossing, cycle markings at the junction and without any traffic survey data to confirm otherwise, it is assumed that cyclists do use this junction. Therefore, in the case of no dedicated cycle provision being installed, either a narrow 5.5m carriageway width or a width in excess of 6.5m should be considered. Based on the turning requirement at the junction and the curved alignment of Bentley Road over the first 100m from the junction a 5.5m wide carriageway is considered too restrictive to the passing of HGVs and may lead to vehicles stopping in close proximity to the junction creating a hazard. Therefore, a wider carriageway in line with the guidance from HAUC of 6.75m should be installed. Alternatively, dedicated cycle provision could be installed, allowing for a narrower carriageway width determined by the two-way HGV traffic swept path analysis without further considerations.

Drawings 104560-MMD-00-XX-DR-CE-1058-1 and 2 show three possible design options for the widening of the carriageway. Option 1 represents the widening to 6.75m, with no dedicated cycle infrastructure. Options 2 and 3 represent the widening in the case of installing a cycle track.

At Option 3, the proposed cycle track would run at a distance of 5m from the Bentley Road carriageway for the majority of its length but at the junction between the A120 and Bentley Rd it would gradually approach the edge of carriageway as it turns left following the corner radius of the junction and the A120 alignment afterwards, up to reaching the height of the existing crossing north of the junction. A safety buffer from the main carriageway would be provided at all times, either via a grassed verge (swale) or hatched markings, with a minimum width of 1.5m[1] at the height of the crossing at the A120.

Figure 7.0 – A120 & Bentley Rd Junction widening and proposed cycle track layout (Option 3)

[1] Minimum safety buffer width as per Table 6-1 of the Local Transport Note 1/20, Cycle Infrastructure Design, for a speed limit of 50mph (speed limit on the A120, along the junction).

The proximity of a residential property on the south side of Bentley Road and the close proximity of the boundary fence to the carriageway means that the widening works should be accommodated on the northern side. The widening works are expected to consist of approximately 1.6m of additional carriageway width constructed into the existing verge of the highway. Between the main carriageway and the proposed cycle track there would be a grassed verge separation of 5m (where possible), likely used to install a drainage swale.

The proposed allowance (Red Line Boundary) to accommodate the works has been set at a distance of 10m from the current edge of the carriageway on the road side to be widened.Incomplete utility data is available that shows a water main within the northern verge, this may require diversion or protection. There are also other utilities on the northern verge, like communications, which can be relocated under the cycle track and under the road, if needed.

The works relating to the North Falls & Five Esturies co-located substations can be considered temporary for the duration of construction as during operation and maintenance the volume of HGV traffic will be considerably lower than required for construction. However, the highways authority may wish to adopt the widened infrastructure to retain the improved alignment. This will need to be discussed with the local highway authority, local planning authority and the land owner.. The proposed allowance (Red Line Boundary) to accommodate the works may need to be reassessed following completion of a topographical survey and detailed design. Currently, there is no positive drainage system along this section of Bentley Road with surface runoff shedding to the adjacent land. As mentioned above, one of the design options comprises the installation of drainage swales along Bentley Rd between the main carriageway and the proposed cycle track. A formal drainage design strategy has not been developed at this stage and will need to be further insvestigated at later stages of the project.

3.3 This section of the assessment identifies the proposed junction improvement works required to facilitate the use of the junction as a construction access for multiple construction sites.

Construction traffic volumes have been estimated in documents 104560-MMD-00-XX-RP-CE-1041 and 104560-MMD-00-XX-TN-CE-1051, Construction Methodologies and Parameters for the co-located substation works and for Bentley Rd, Ardleigh Rd and the New Haul Rd respectively.. For a single substation it has been estimated that an AADT flow of approximately 57 vehicle movements (two way) would be required. Given that there is the potential for up to 3 substations to be under construction at the site then 171 vehicle movements (two way) have been assumed for the substations works. There will also be the requirement for cabling works along the route, an early estimate of 150 vehicle movements (two way) has been assumed for this assessment. The total construction traffic volume for this assessment has therefore been taken to be 321 vehicle movements (two way).

Apart from these values relative to the substations construction and cable installation works, there will also be significant HGV traffic (using different lengths of the access roads) for the duration of the improvement/widening works at Bentley Rd and Ardleigh Rd themselves and the construction of the new haul road. We estimate a monthly average of 370 two-way HGV movements. A manual traffic survey was undertaken by Streetwise Services Ltd on 20th September 2022, the survey was a single survey between 06:30 to 18:30. The data from the survey is summarised below.

Table 1 – Summary of traffic survey data

Traffic Movement	Total number of vehicles
A120 Eastbound (Through movement)	3498
A120 Westbound (Through movement)	4105
A120 to Bentley Road	332
Bentley Road to A120	166

In addition to the survey data available, historic data has been reviewed where available. This has shown a traffic flow on the A120 (both directions) of 13281 vehicle movements. (Source: https://roadtraffic.dft.gov.uk/#14/51.9019/1.0518/basemap-countpoints, from manual count location 7938, located approx. 470m north of the Bentley Road A120 junction. Disclaimer: this is an estimated count based on previous data). Given a two way AADT from the Streetwise survey of 7603, for this assessment we have used the 13281 value as more conservative. For Bentley Road the two way AADT can be estimated to be approximately 819 vehicle movements, calculated as 321 + 498, considering the predicted construction flow and the existing traffic flow respectively.

Using CD123 - Geometric design of at-grade priority and signal-controlled junctions, from the Design Manual for Roads and Bridges (DMRB), Figure 2.3.1 shows approximate priority junction provision on single carriageway roads based on traffic flows only. Using a main line flow of 13281 vehicles, and an estimated minor road flow of819, Figure 2.3.1 shows that a simple junction arrangement is not suitable.

Figure 2.3.1 Approximate priority junction provision on single carriageway roads based on flows only

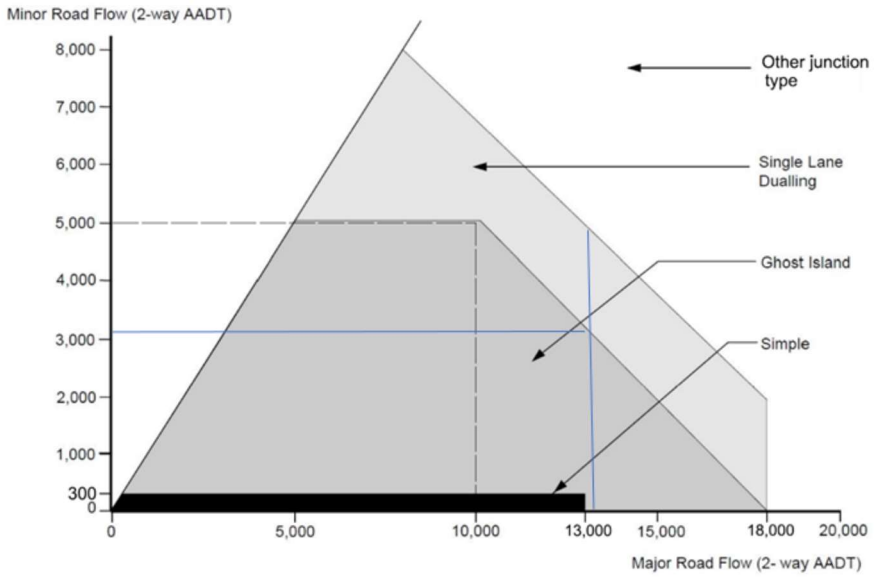


Figure 8.0 – extract from CD123

Figure 2.3.1 suggests a Ghost Island or Single Lane Dualling arrangement should be used at the Bentley Road A120 junction.

The mainline arrangement at the junction has been installed in line with a Single Lane Dualling (SLD) arrangement, (noting that the right turn movements have been excluded through the

installation of VRS within the central reserve). Therefore, the minor road junction arrangement in line with a SLD design has been considered in this assessment.

There are two arrangements for a merge corner under an SLD arrangement, with and without a merge taper. The requirement for a merge taper at a SLD junction is triggered by the number of left out turning movements. Greater than 600 vehicles turning out, as a AADT flow, would necessitate the merge taper, this number is reduced to 450 vehicles if greater than 20% of the vehicles are HGVs., The existing traffic flows surveyed show 166 vehicles and the estimated construction vehicles would be 321 vehicles, so a total of 487 vehicles with in excess of 20% being HGVs.

It is considered suitable to allow for a merge taper within the design of the junction, given the early stage of design development and the uncertainty over traffic volumes.

Where a merge taper is to be provided a 25m merge corner radius should be used leading into a 3.5m wide merging taper that reduces to join the main line carriageway. The length of the taper is dependent on the design speed of the mainline, for this assessment given the posted speed limit of 50mph, a design speed of 85kph has been used, equating to a taper length of 90m.

Widening into the footway will be required as well as vegetation and tree removal behind the existing footway to accommodate the cycle track replacing it. The carriageway road marking will need to be amended to allow for the merge taper markings to be installed. Land take is likely to be required to facilitate footway replacement, planting and relocation of utilities and signage.

The proposed works can be seen on drawing 104560-MMD-00-XX-DR-CE-1028.

No consultation has been undertaken with the local highway authority to date, and no traffic survey data or traffic modelling data has been available for this assessment. Further improvements to the junction may be required following stakeholder engagement and traffic modelling works, for example a signal controlled junction may be preferred if queuing lengths on Bentley Road are shown to be excessive. From a land take perspective it is considered viable to install a signal controlled crossing within the current highway boundary, although widening of Bentley Road would still be required the merge taper would not be.

4 Traffic Management

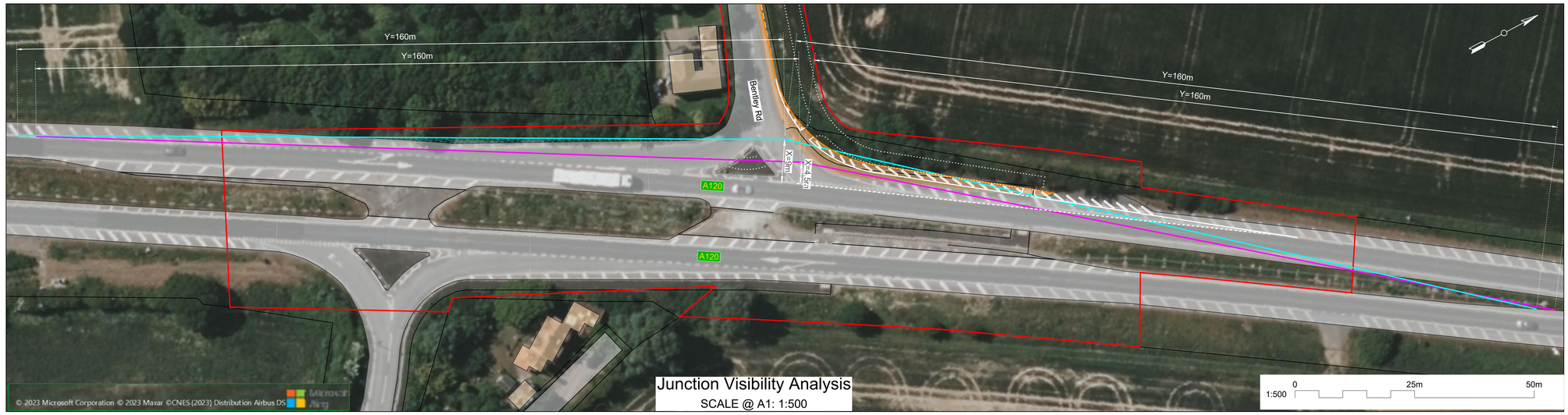
The junction improvements will require traffic management during the installation. This section of the assessment identifies the likely traffic management requirements and their potential impacts.

To complete the widening works along Bentley Road the road will need to be closed to traffic, although access to residences would need to be retained for the duration. A diversion along Payne's Lane, Hilliards Road and Park Road will be needed, this is approximately a 4km diversion.

The A120 lanes are sufficiently wide to accommodate a narrowed open lane past the working area within the central reserve but the A120 carriageway will require some widening at the northern corner radius with Bentley Rd and along mainline up to the height of the crossing, for the installation of a shoulder strip functioning also as safety buffer for users of the proposed cycle track. Road marking would need to be removed and vehicles routed over the chevroned sections of the carriageway.

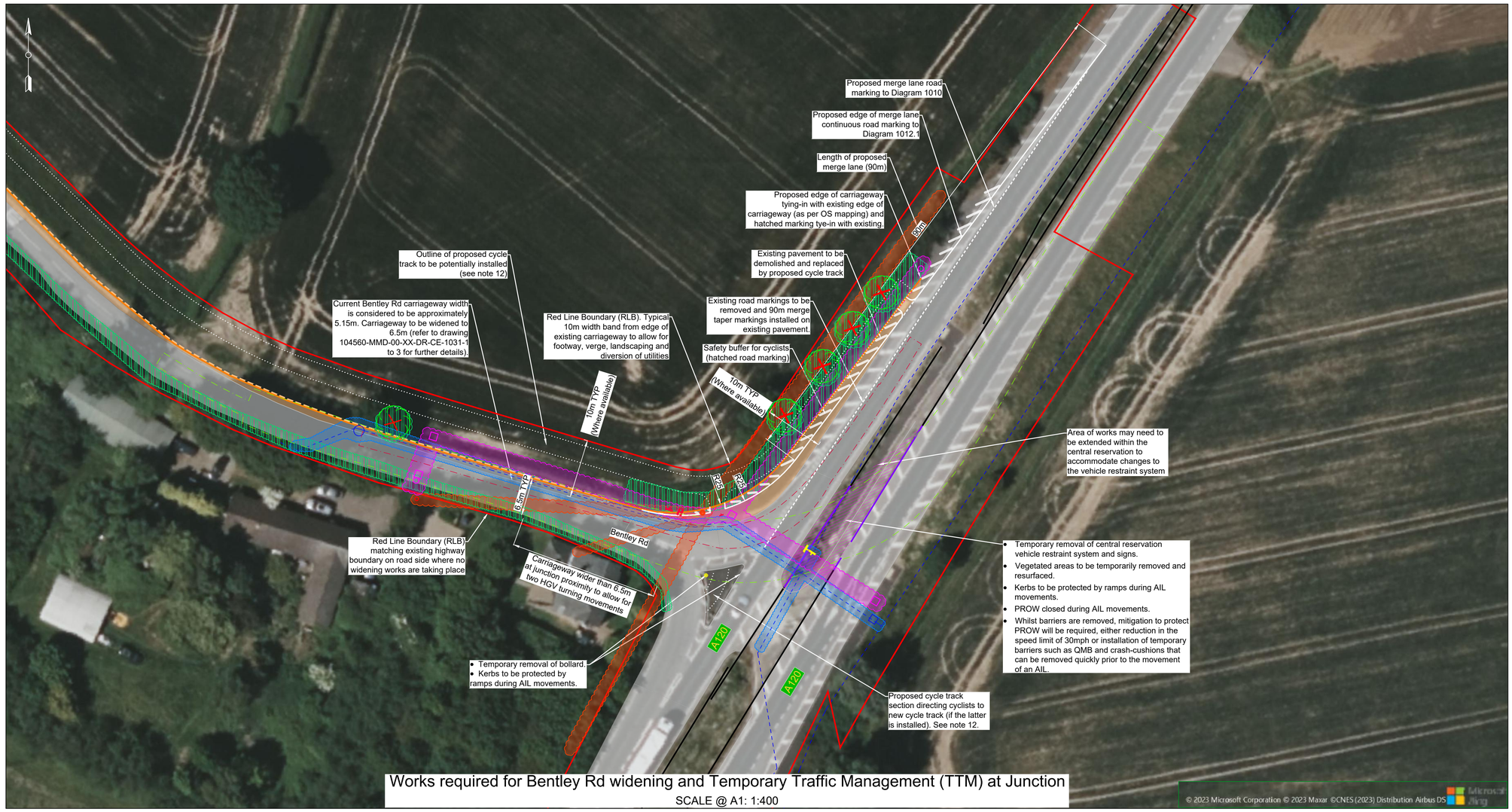
Lane closure of the A120 eastbound carriageway will be required for the installation of the merge taper at the junction and the carriageway widening. With works undertaken to remove a section of the island at the junction of Little Bromley Road on the westbound carriageway, a contraflow traffic management arrangement would be possible under a reduced speed limit. Alternatively works could be undertaken with traffic signals and shuttle working through the works, this could be accommodated over a series of night works to limit the impact on road users.

5 Appendix A – Junction Drawing



Junction Visibility Analysis
SCALE @ A1: 1:500

1:500 0 25m 50m



Works required for Bentley Rd widening and Temporary Traffic Management (TTM) at Junction
SCALE @ A1: 1:400

1:400 0 20m 40m

Notes

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2. All dimensions are in meters unless otherwise stated.
3. This drawing is to be printed in colour.
4. This drawing is to be read in conjunction with all relevant documents and drawings.
5. No unauthorised disclosure, storage or copying.
6. All spatial coordinates relate to the Ordnance Survey, British National Grid (OSGB36).
7. All levels are in meters and relate to AOD (Ordnance Survey, Newlyn).
8. The A road A120 has a 50mph (~80.5kph) speed limit applying to the dual carriageway section, where the junction with Bentley Road is located. For the purpose of visibility analysis, it has been considered a design speed of 85kph (~100kph) for the A120, as the above closer value as per DMRB, CD 109 *Highway link design*, Table 2.10. Based on Table 2.10, the desirable minimum length of visibility splays (Stopping sight distance - SSD) for a design speed of 85kph is 160m.
9. Indicative design layout based of OS grid, works may vary subject to detailed design and site survey.
10. Only partial utilities data has been provided for this indicative design, full PAS128 utilities surveys shall be required and additional land take may be required to accommodate diversions.
11. For swept path details, refer to drawings 104560-MMD-00-XX-DR-CE-1026 and 104560-MMD-00-XX-DR-CE-1027.
12. For further information on the transition detail carriageway/cycle track for the proposed cycle track, please refer to drawing 104560-MMD-00-XX-DR-CE-1059, Sheet 2.
13. Existing water utility may require diversion or protection in some areas.

Legend:

- OS grid map feature lines
- Visibility splays at 4.5m from stopping line
- Visibility splays at 9m from stopping line
- Extents of vegetation and street furniture clearance to achieve visibility requirements at X=9m
- Construction works boundary (red line boundary)
- Proposed new edge of carriageway
- Proposed permanent carriageway widening at junction
- Proposed new carriageway edge (indicative) for a width of 6.75m
- Proposed location for a potential cycle track installation
- AIL vehicle body & load swept path envelope
- Wheels swept path envelope for HGV exiting Bentley Rd
- Existing underground water pipes
- Existing road restraint system at central reservation
- Existing road restraint system elements to be temporarily removed
- Area of works in central reservation for TTM
- Existing road signs to be removed during AIL movements
- Existing road signs to be relocated for road widening
- Existing bollard to be removed during AIL movements
- Electricity pole to be relocated (location extracted from Survey)
- Utility diversion or undergrounding required (Comms)
- Utility diversion or undergrounding required (Electricity)
- Water pipe protection or diversion required
- Vegetation / trees to be trimmed (or removed if on side to be widened; subject to detailed survey)
- Existing trees to be removed (subject to detailed survey)
- Existing electricity pole (location extracted from Survey)
- Existing communications chamber/pole (location extracted from Survey)
- Existing water chambers (location extracted from Survey)

Reference drawings

104560-MMD-00-XX-DR-CE-1026 - Swept Path Analysis AIL (...) accessing Bentley Rd
104560-MMD-00-XX-DR-CE-1027 - Swept Path Analysis (...) Artic. Veh.-Two Way Traff.
104560-MMD-00-XX-DR-CE-1031-1 to 3 - Bentley Rd Improvements Layout and Red Line Boundary for works
104560-MMD-00-XX-DR-CE-1059-1 & 2 - Proposed Cross-over points for Cycle Track
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Rev	Date	Drawn	Description	Ch'k'd	App'd
P03	30/11/2023	SAP	Cycle track added; road width updated	JW	AFC
P02	13/04/2023	SAP	Merge taper incorporated	JW	MB
P01	05/04/2023	SAP	Preliminary	JW	MB

Status Stamp
PRELIMINARY

MOTT MACDONALD
Victory House
Trafalgar Place
Brighton, BN1 4FY
United Kingdom
T +44 (0)1273 36500
W www.mottmac.com

Client
NORTH FALLS Offshore Wind Farm
FIVE ESTUARIES OFFSHORE WIND FARM

Title
A120 - Bentley Road Junction
Swept Path Analysis
Road improvements layout

Sheet 01 of 01

Designed	S. Amado-Pedrosa	SAP	Eng check	John Weeks	JW
Drawn	S. Amado-Pedrosa	SAP	Coordination	Andrea F. Crespo	AFC
Dwg check	Ollie Jeffcock	OJ	Approved	Matthew Barton	MB

MMD Project Number	Scale at A1	Security
104560-001	As Shown	STD
Client Number		Suit. Code
004781329-03		S3
Drawing Number		Revision
104560-MMD-00-XX-DR-CE-1028		P03

Appendix X A120/Bentley Road Improvements

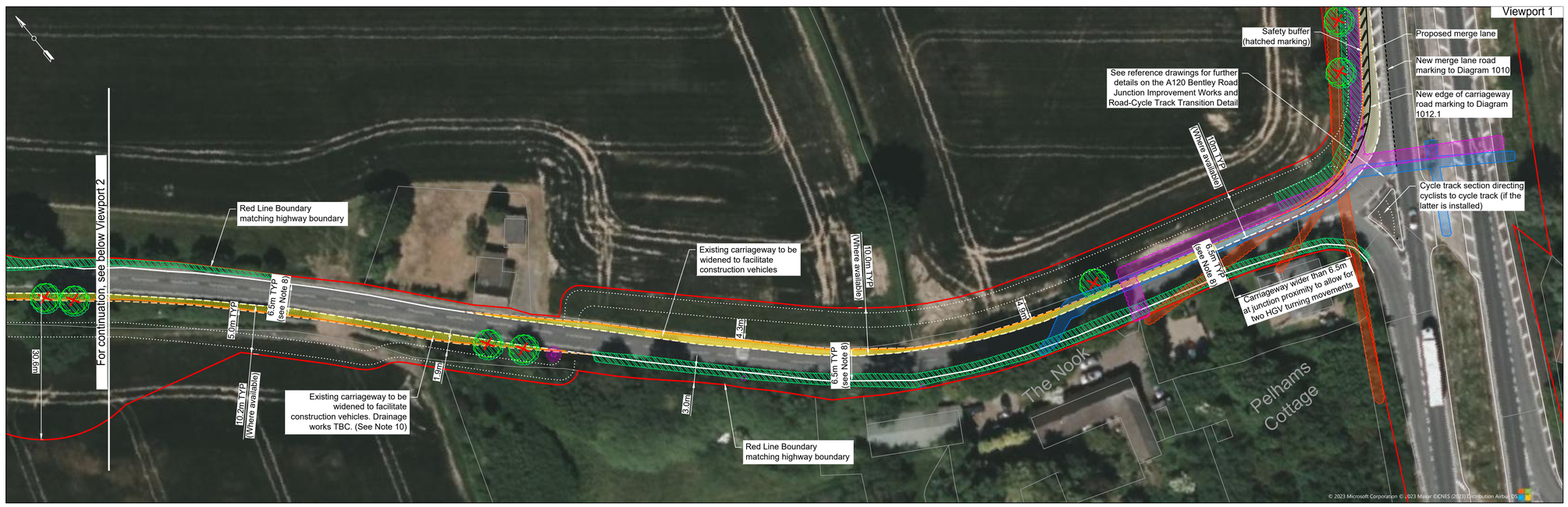
Volume 6, Part 6, Annex 8.1 Transport Assessment (Onshore)

Five Estuaries Offshore Wind Farm

Five Estuaries Wind Farm Ltd

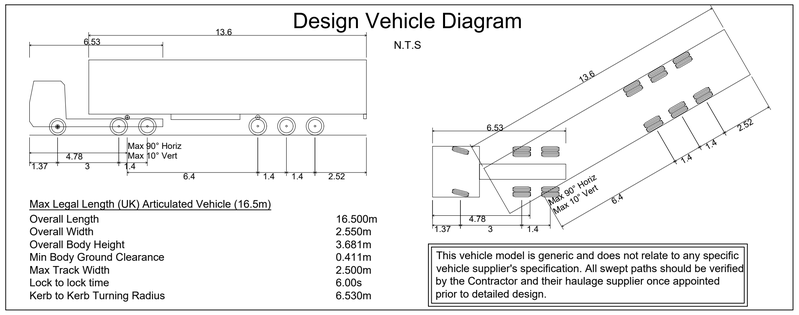
SLR Project No.: 404.V05356.00010

3 March 2025



Design Vehicle Diagram

N.T.S



Max Legal Length (UK) Articulated Vehicle (16.5m)

Overall Length	16.500m
Overall Width	2.550m
Overall Body Height	3.681m
Min Body Ground Clearance	0.411m
Max Track Width	2.500m
Lock to lock time	6.00s
Kerb to Kerb Turning Radius	6.530m

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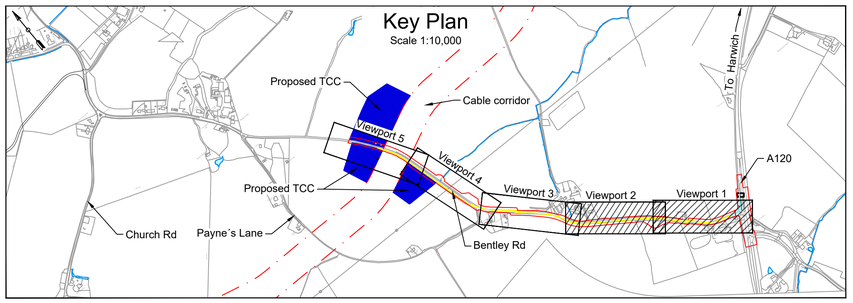
Legend (continuation)

- Existing trees to be removed (subject to detailed survey)
- Assumed location of existing electricity / communication poles
- Location of existing communication pole extracted from survey
- Location of existing electricity pole extracted from survey



1:500 0 25m 50m

1:10,000 0 500m 1000m

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7. AIL vehicle deliveries are expected to use both carriageway lanes and will require traffic control / pilots during movements. Additional works (not shown), i.e. removal of street furniture, vegetation and structures may be required to facilitate AIL vehicle over-swings. All swept paths should be verified by the Contractor and their haulage suppliers at the earliest opportunity to ensure clearances are suitable for the intended vehicles.
8. Existing carriageway lines have been determined using OS Mastermap data in absence of Topographical survey data. OS data is considered to be less accurate. Widening works are intended to show the concept of an increase to a 6.5m carriageway width where the installation of a segregated cycle track is included in the final arrangement. The outline of a potential carriageway widening to 6.75m (where no dedicated cycle/pedestrian provision is to be installed) is also shown as another option. The extents of the widening works and planning application boundary are therefore subject to change following detailed horizontal alignment design and receipt of Topographical data.
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Legend:

- OS grid map feature lines
- Construction works boundary (red line boundary) at Bentley Rd
- Existing carriageway edge - OS feature line - to remain unaltered
- Existing carriageway edge - OS feature line - to be modified
- Proposed new carriageway edge (indicative) for a width of 6.5m
- Proposed carriageway widening at Bentley Rd for a width of 6.5m
- Proposed new carriageway edge (indicative) for a width of 6.75m
- Proposed location for a potential cycle track installation
- Proposed carriageway widening at junction with the A120
- Existing surface water wide ditch / watercourse to remain
- Utility diversion or undergrounding required (Comms)
- Utility diversion or undergrounding required (HV)
- Water pipe protection or diversion required
- Vegetation / trees to be trimmed (or removed if on side to be widened; subject to detailed survey)

Reference drawings

104560-MMD-00-XX-DR-CE-1028 - A120 Bentley Road Junction Improvement Works
104560-MMD-00-XX-DR-CE-1032-1 & 2 - Bentley Rd w/ Cable Haul Rd Jct & SPA (Sheets 1 & 2)
104560-MMD-00-XX-DR-CE-1033 - New Bellmouth Access at Bentley Rd Jct for AIL Haul Road Diversion
104560-MMD-00-XX-DR-CE-1034 - Bentley Rd to Ardleigh Rd AIL Haul Rd Diversion
104560-MMD-00-XX-DR-CE-1059-1 & 2 - Proposed Cross-over points for Cycle Track
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Rev	Date	Drawn	Description	Ch'k'd	App'd
P03	30/11/2023	SAP	RLB & cycle track updated	JW	AFC
P02	08/09/2023	SAP	Red Line Boundary updated	JW	AFC
P01	24/04/2023	SG	Concept design for comment	JW	MB

Status Stamp

PRELIMINARY

MOTT MACDONALD
Victory House
Trafalgar Place
Brighton, BN1 4FY
United Kingdom
T +44 (0)1273 36500
W www.mottmac.com

Client

NORTH FALLS Offshore Wind Farm
FIVE ESTUARIES OFFSHORE WIND FARM

Title

Co-located Substation Early Design Bentley Rd Improvements Layout and Red Line Boundary for works

Sheet 01 of 03

Designed	S. Goode	SG	Eng check	J. Weeks	JW
Drawn	S. Goode	SG	Coordination	J. Weeks	JW
Dwg check	S. Amado-Pedrosa	SAP	Approved	M. Barton	MB

MMD Project Number 104560-001	Scale at A1 1:500	Security STD
Client Number 004786178-03		Suit. Code S3
Drawing Number 104560-MMD-00-XX-DR-CE-1031-1		Revision P03

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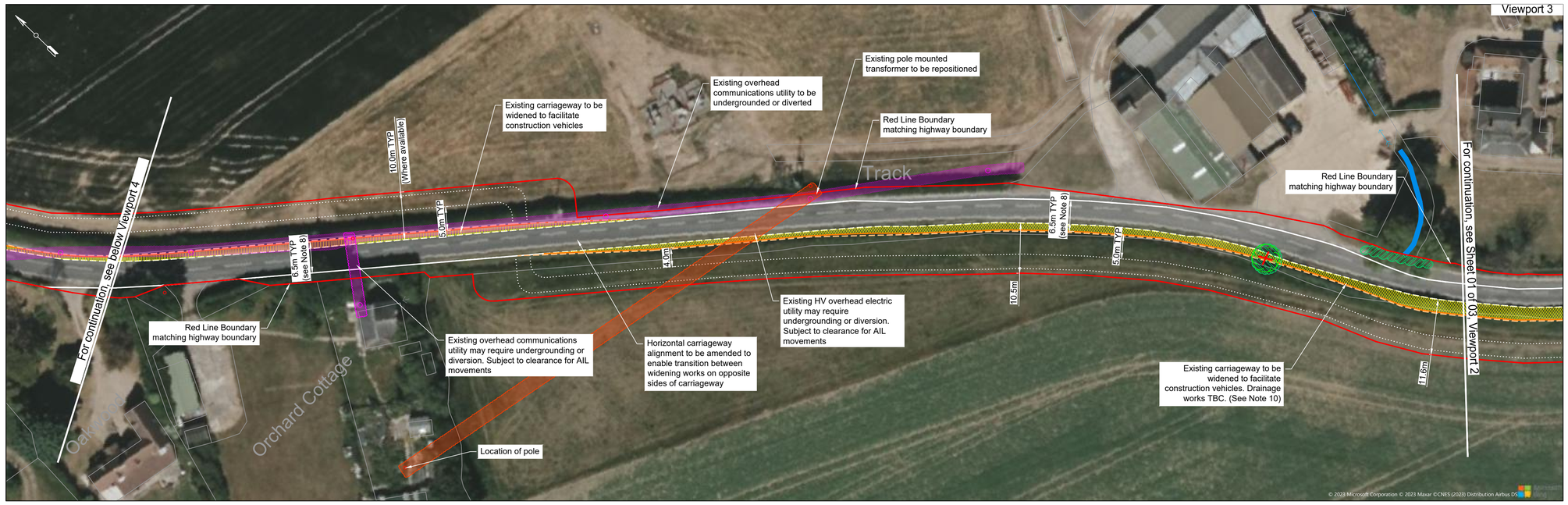
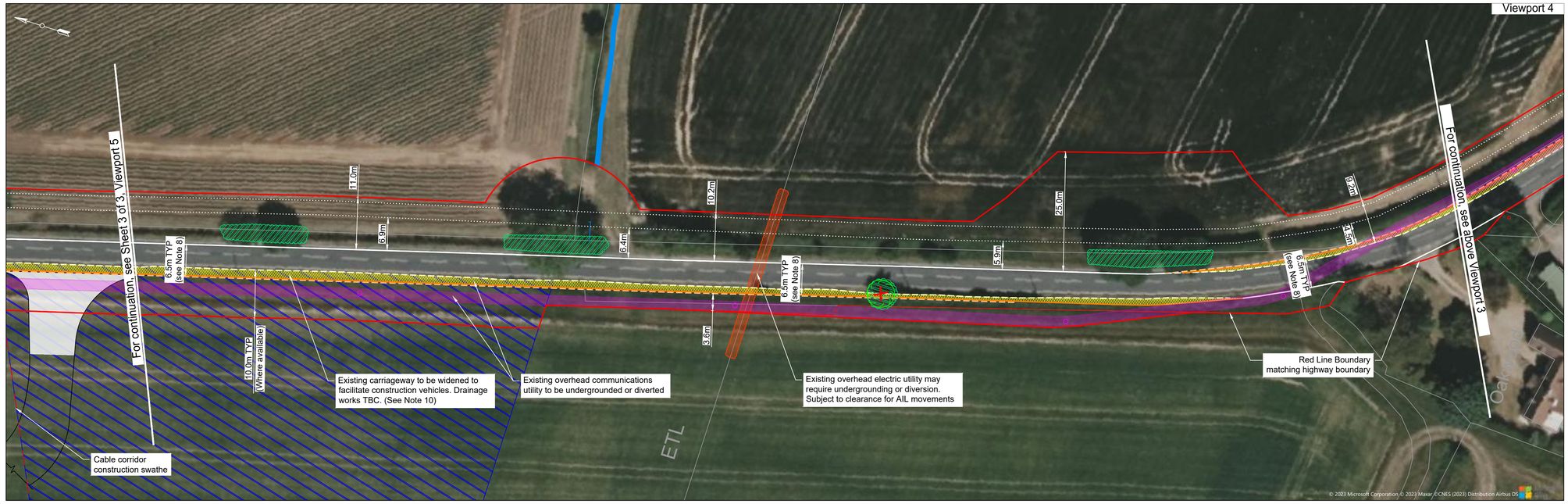
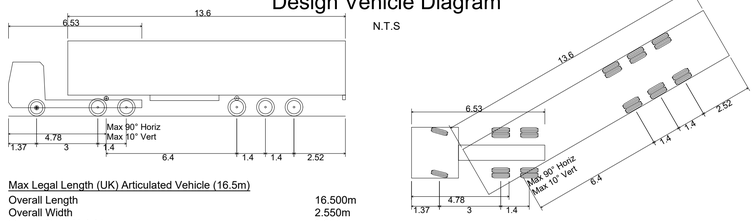




Design Vehicle Diagram

N.T.S



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Overall Body Height	3.681m
Min Body Ground Clearance	0.411m
Max Track Width	2.500m
Lock to lock time	6.00s
Kerb to Kerb Turning Radius	6.530m

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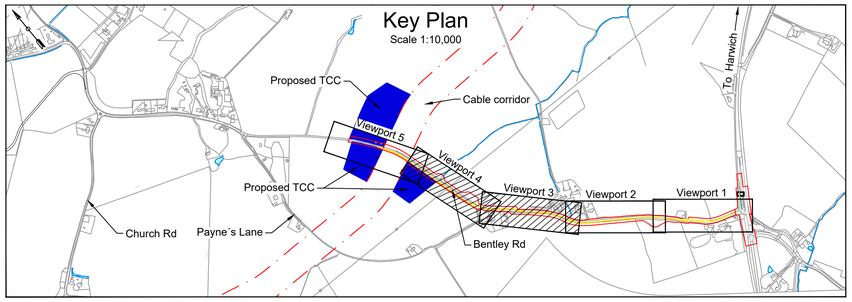
Legend (continuation)

- Proposed TCC location
- Location of existing communication pole extracted from survey
- Location of existing electricity pole extracted from survey

Key Plan

Scale 1:10,000



1:500 0 25m 50m

1:10,000 0 500m 1000m

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Legend:

- OS grid map feature lines
- Construction works boundary (red line boundary) at Bentley Rd
- Cable corridor construction swathe
- Existing carriageway edge - OS feature line - to remain unaltered
- Existing carriageway edge - OS feature line - to be modified
- Proposed new carriageway edge (indicative) for a width of 6.5m
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Reference drawings

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PRELIMINARY

MOTT MACDONALD
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T +44 (0)1273 36500
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Client

NORTH FALLS Offshore Wind Farm
FIVE ESTUARIES OFFSHORE WIND FARM

Title

Co-located Substation Early Design Bentley Rd Improvements Layout

Sheet 02 of 03

Designed	S. Goode	SG	Eng check	J. Weeks	JW
Drawn	S. Goode	SG	Coordination	J. Weeks	JW
Dwg check	S. Amado-Pedrosa	SAP	Approved	M. Barton	MB

MMD Project Number 104560-001	Scale at A1 1:500	Security STD
Client Number 004786179-03		Suit. Code S3
Drawing Number 104560-MMD-00-XX-DR-CE-1031-2		Revision P03

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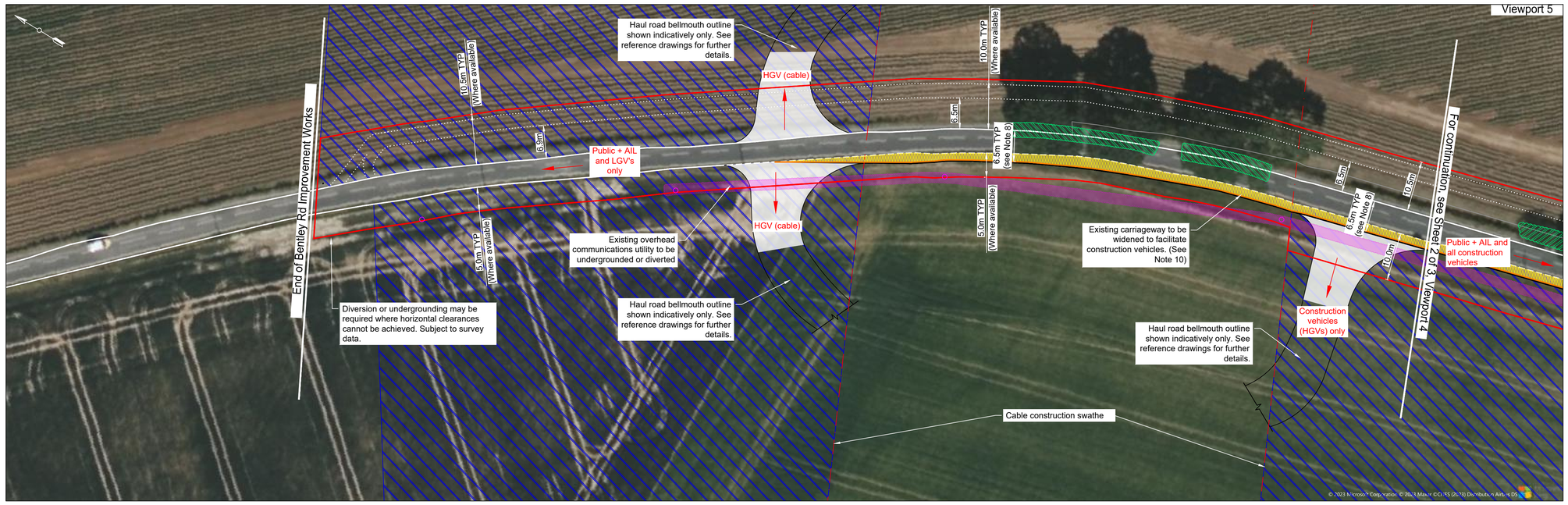

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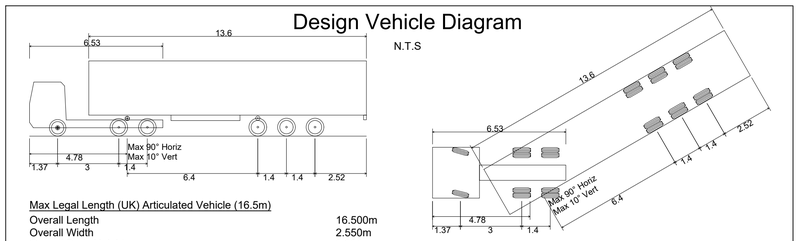
Design Vehicle Diagram

N.T.S



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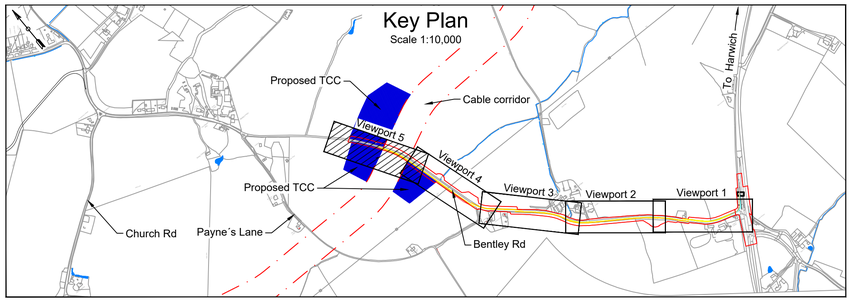
Key Plan

Scale 1:10,000



1:500 0 25m 50m

1:10,000 0 500m 1000m

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- Proposed new carriageway edge (indicative) for a width of 6.5m
- Proposed carriageway widening at Bentley Rd for a width of 6.5m
- Proposed new carriageway edge (indicative) for a width of 6.75m
- Proposed location for a potential cycle track installation
- Utility diversion or undergrounding required (Comms)
- Location of existing communication pole extracted from survey
- Vegetation / trees to be trimmed
- Proposed TCC location

Reference drawings

104560-MMD-00-XX-DR-CE-1028 - A120 Bentley Road Junction Improvement Works
104560-MMD-00-XX-DR-CE-1032-1 & 2 - Bentley Rd w/ Cable Haul Rd Jct & SPA (Sheets 1 & 2)
104560-MMD-00-XX-DR-CE-1033 - New Bellmouth Access at Bentley Rd Jct for AIL Haul Road Diversion
104560-MMD-00-XX-DR-CE-1034 - Bentley Rd to Ardleigh Rd AIL Haul Rd Diversion
104560-MMD-00-XX-DR-CE-1059-1 & 2 - Proposed Cross-over points for Cycle Track
Utility Report Digitised_OSGB36 (received in January 2023)
VE-NF_Draft_Combined_Cable_Corridor_Rev_6 (received 29/09/2023)
VE-NF_Draft_TCC_Locations_Rev_6 (received 29/09/2023)
UK_FES_Work_Areas_py_OSGB36_v8_13_Extract (received 16/11/2023)
UK_FES_Work_Areas_py_OSGB36_v8_13B_Extract (received 16/11/2023)

Rev	Date	Drawn	Description	Ch'k'd	App'd
P03	30/11/2023	SAP	RLB & cycle track updated	JW	AFC
P02	08/09/2023	SAP	Red Line Boundary updated	JW	AFC
P01	24/04/2023	SG	Concept design for comment	JW	MB

Status Stamp

PRELIMINARY

MOTT MACDONALD
Victory House
Trafalgar Place
Brighton, BN1 4FY
United Kingdom
T +44 (0)1273 36500
W www.mottmac.com

Client

NORTH FALLS Offshore Wind Farm
FIVE ESTUARIES OFFSHORE WIND FARM

Title

Co-located Substation Early Design
Bentley Rd Improvements Layout

Sheet 03 of 03

Designed	S. Goode	SG	Eng check	J. Weeks	JW
Drawn	S. Goode	SG	Coordination	J. Weeks	JW
Dwg check	S. Amado-Pedrosa	SAP	Approved	M. Barton	MB

MMD Project Number 104560-001	Scale at A1 1:500	Security STD
Client Number 004786180-03		Suit. Code S3
Drawing Number 104560-MMD-00-XX-DR-CE-1031-3		Revision P03

Stage 1 Road Safety Audit

A120 / Bentley Road

Five Estuaries Offshore Wind Farm

Prepared by:

SLR Consulting Limited

Ground Floor Helmont House , Churchill Way, Cardiff,
CF10 2HE

SLR Project No.: 402.065339.00001

Client Reference No: XXXX

20 November 2024

Revision: 01

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
01	20 November 2024	Alastair Pike	Ben Finch	Alastair Pike
	Click to enter a date.			

Basis of Report

This document has been prepared by SLR Consulting Limited (SLR) with reasonable skill, care and diligence, and taking account of the timescales and resources devoted to it by agreement with Five Estuaries Offshore Wind Farm (the Client) as part or all of the services it has been appointed by the Client to carry out. It is subject to the terms and conditions of that appointment.

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Table of Contents

Appendices

Acronyms and Abbreviations

RSA	Road Safety Audit
DMRB	Design Manual for Roads and Bridges
MfS	Manual for Streets
PIC	Personal Injury Collisions
DfS	Departures from Standards
SPA	Swept Path Analysis
HGV	Heavy Goods Vehicle
NMU	Non-Motorised Users

1.0 Introduction

1.1 This report results from a Stage 1 Road Safety Audit carried out on Wednesday 20th November 2024. The RSA was carried out on behalf of Five Estuaries Offshore Wind Farm. The Overseeing Organisation for this Stage 1 is National Highways.

1.2 An Audit Brief was prepared by Daniel Moran of SLR Consulting Ltd on 13th September 2023. This Audit Brief was formally accepted by the Audit Team on the same date.

1.3 This Road Safety Audit team was as follows:

ALASTAIR PIKE, MICE, MCIHT, MSoRSA, HE Approved Cert. Comp.
Audit Team Leader
Head of Road Safety
SLR Consulting Ltd

Ben Finch
Audit Team Member
Senior Transport Planner
SLR Consulting Ltd

Ross Corbyn
Audit Team Observer
Senior Road Safety Engineer
National Highways

Kelly Milburn
Audit Team Observer
Spatial Planning Manager
National Highways

1.4 A site visit was undertaken by the Audit Team on Thursday 14th November 2024, between the hours of 13:00 and 14:30. The weather at the time of the visit was overcast and the carriageway surface was generally dry. Vehicular traffic levels were considered to be low. There were no pedestrian and no cyclist movements observed during this time.

1.5 Site location plans can be found at **Appendix A** of this report.

1.6 The terms of reference of the Road Safety Audit are as described in the Design Manual for Roads and Bridges (DMRB) Standard, GG119 Road Safety Audit.

1.7 The Audit Team has examined and reported only on the road safety implications of the scheme as presented and has not examined or verified the compliance of the designs to any other criteria. However, to clearly explain a safety problem or the recommendation to resolve a problem the Audit Team may, on occasion, have referred to a design standard without touching on technical audit.

1.8 A table of documents submitted for this Stage 1 RSA can be found in **Appendix B**.

1.9 The scheme subject to Stage 1 RSA considers amendments to the Bentley Road / A120 junction. 74.720m HGV's will be required to travel along the A120 contrary to general traffic

directions and then to enter Bentley Road. Junction widening is proposed along with additional amendments to the existing shared use cycleway / footway arrangements.

1.10 Submitted design drawings have been annotated to show the locations of any problems identified during this Stage 1 RSA. These plans can be found at **Appendix C**.

1.11 Whilst recommendations have been made within this report, there may be equally satisfactory alternatives. The Audit Team will be pleased to consider alternatives if required.

Departures from Standards

1.12 The Audit Team were not informed of any Departure from Standards (DfS) associated with the design proposals.

2.0 Matters arising from this Stage 1 RSA

Drawing Number: 104560-MMD-00-XX-DR-CE-1070_ Rev 01

2.1 Problem.

Location: A120 / Bentley Road Junction.

Summary: Lack of hazard warning tactile paving provided at dropped kerbs leading to the NMU route may lead to collisions between NMU's and vehicular traffic.

Design drawings show an extension of the NMU route adjacent to the A120. An existing splitter island will be amended with dropped kerbs and road markings to allow NMU users to leave the A120 North west bound. This design is not shown complete with hazard warning tactile paving that would alert NMU's particularly those with visual impairments that they are about to enter the vehicular carriageway. This arrangement may in turn lead to collisions between NMU's and vehicular traffic.

Recommendation:

It is recommended that any access points to the vehicular carriageway are provided with the appropriate tactile paving installations.

Drawing Number: 104560-MMD-00-XX-DR-CE-1066_Rev02

2.2 Problem.

Location: A120 / Bentley Road Junction.

Summary: Overrun of Exceptional 74.720m HGV into NMU corridor

Design drawings show swept path analysis of a multi axle drawbar HGV entering Bentley Road from the A120. The analysis drawing indicates that the body of this exceptional HGV will over sail the new NMU route as the vehicle turns from the A120 onto Bentley Road. This arrangement may lead to collisions between exceptional HGV's and NMU's on the shared use path.

Recommendation:

It is recommended that banks persons are used where HGV's are required to make turns along the route to ensure that pedestrians and vulnerable road users are separated from large vehicle turning movements.

3.0 Audit Team Statement

3.1 We certify that this Audit has been carried out in accordance with the requirements of GG119.

Road Safety Audit Team Leader

Name:	Alastair Pike
Signed:	[redacted]
Position:	Head of Road Safety
Organisation:	SLR Consulting Ltd
Date:	20 November 2024

Road Safety Audit Team Member

Name:	Ben Finch
Signed:	[redacted]
Position:	Senior Transport Planner
Organisation:	SLR Consulting Ltd
Date:	20 November 2024

Overseeing Organisation

Name:	Jeremy Bloom
Signed:	[redacted]
Position:	DCO Projects Lead (East)
Organisation:	National Highways
Date:	29 January 2025

Appendix A Site Location Plans

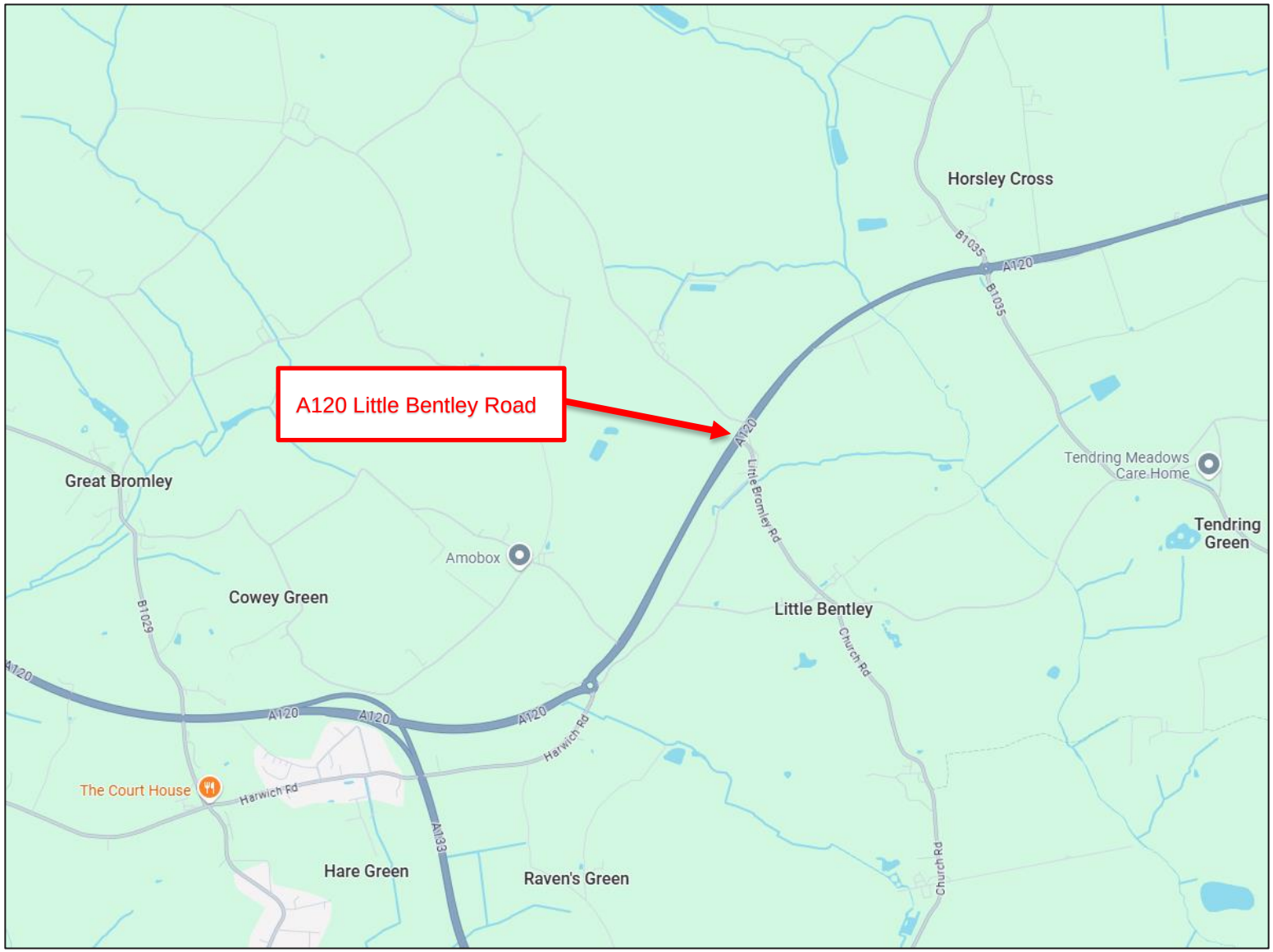
Stage 1 Road Safety Audit

A120 / Bentley Road

Five Estuaries Offshore Wind Farm

SLR Project No.: 402.065339.00001

20 November 2024


A120 Little Bentley Road
Horsley Cross
B1035
A120
B1035
A120
Tendring Meadows Care Home
Tendring Green
Great Bromley
Amobox
Cowey Green
B1029
Little Bromley Rd
Little Bentley
Church Rd
A120
A120
A120
A120
Harwich Rd
Harwich Rd
The Court House
A133
Hare Green
Raven's Green
Church Rd

Appendix B Submitted Documents

Stage 1 Road Safety Audit

A120 / Bentley Road

Five Estuaries Offshore Wind Farm

SLR Project No.: 402.065339.00001

20 November 2024

Submitted Documents

Document	Document Title
Design Drawings	104560-MMD-00-XX-DR-CE-1066_Rev02 104560-MMD-00-XX-DR-CE-1070_ Rev 01 104560-MMD-00-XX-DR-CE-1071
RSA Brief Doc	240118_Bentley Road_A120_Stage_1_RSA Brief

Appendix C Problem Location Plans

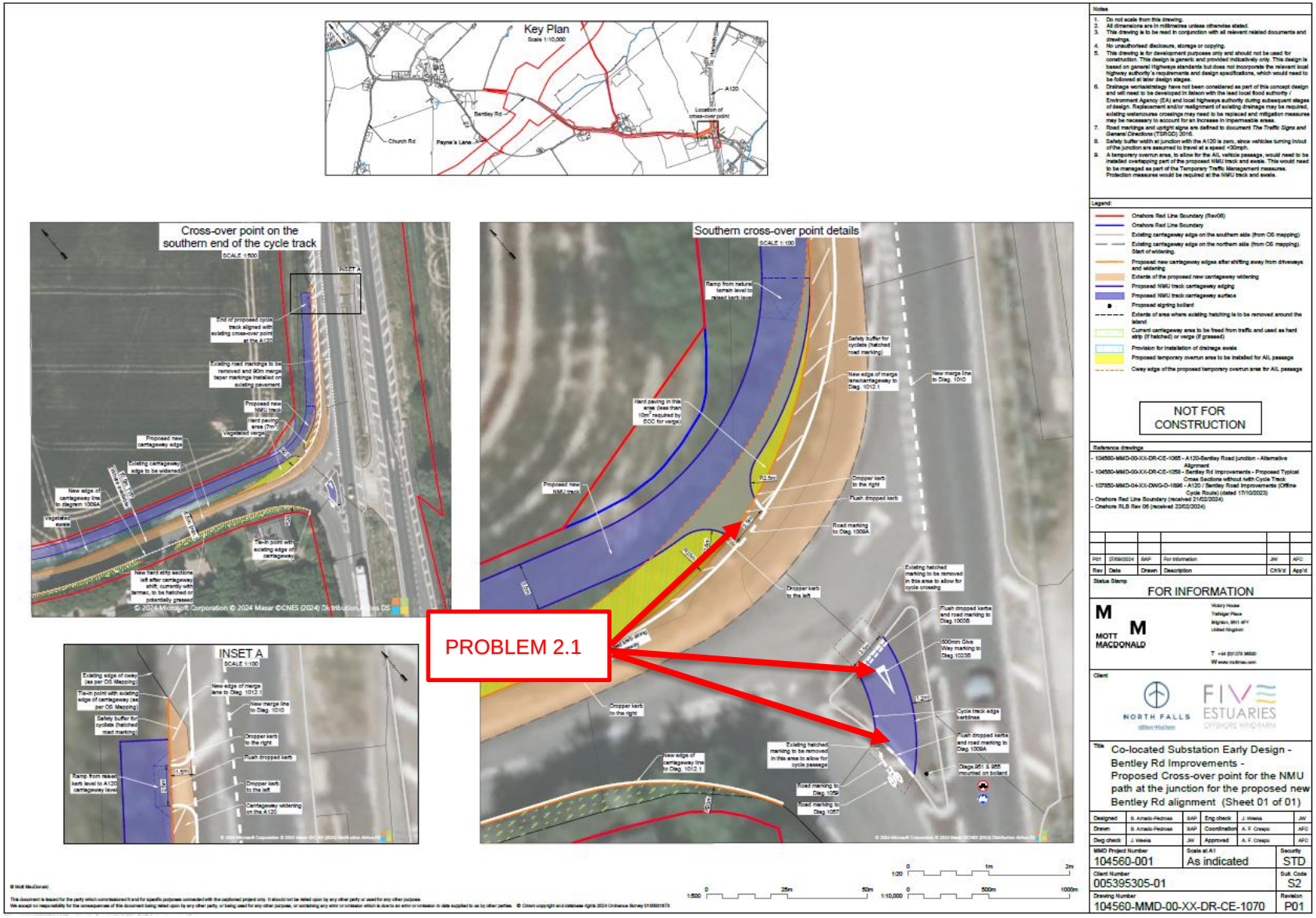
Stage 1 Road Safety Audit

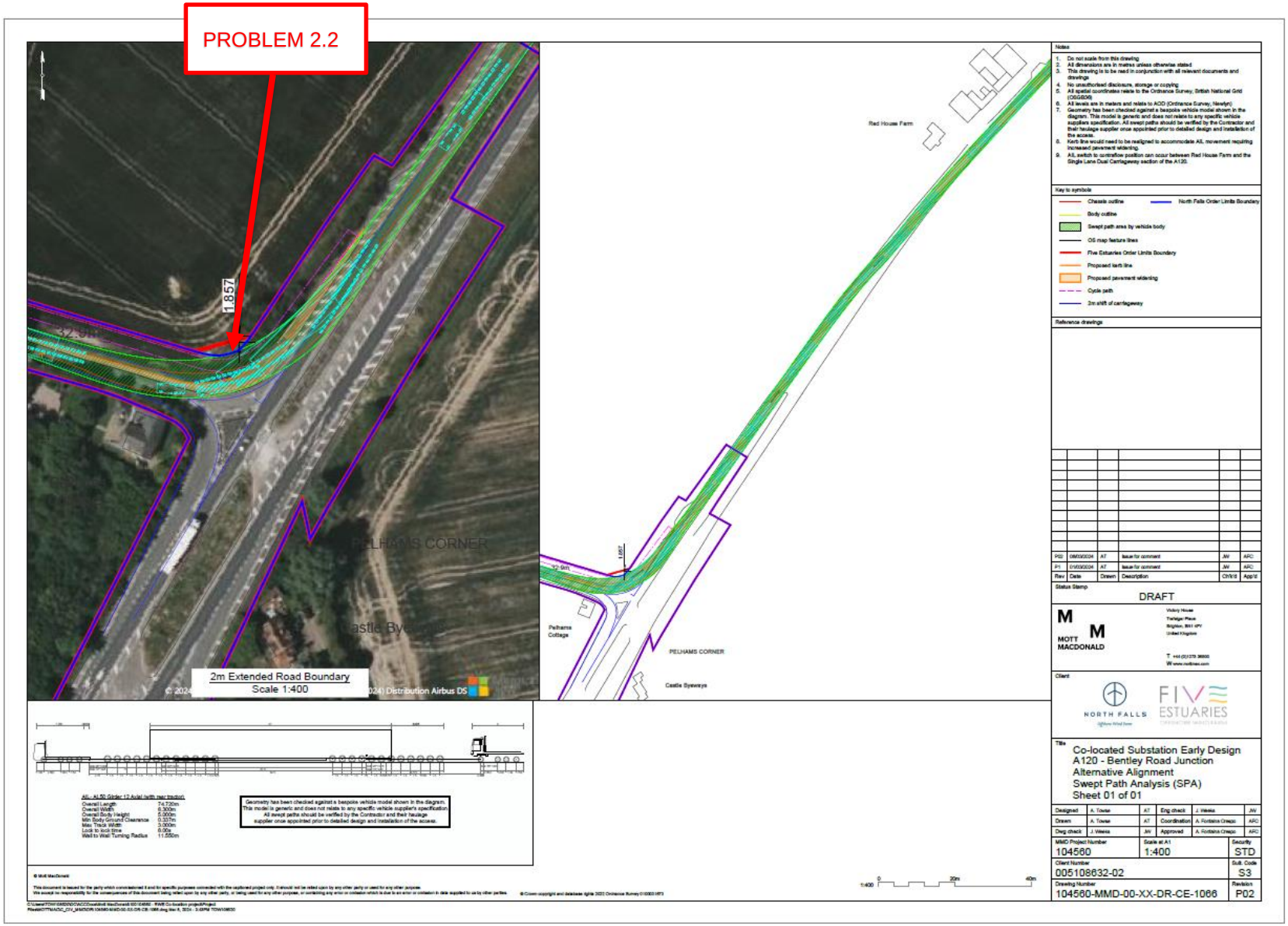
A120 / Bentley Road

Five Estuaries Offshore Wind Farm

SLR Project No.: 402.065339.00001

20 November 2024


Key Plan
Scale 1:10,000
Bentley Rd
Church Rd
Payne's Lane
A120
Location of cross-over point
Cross-over point on the southern end of the cycle track
SCALE 1:500
INSET A
Southern cross-over point details
SCALE 1:100
PROBLEM 2.1
INSET A
SCALE 1:100
Notes
1. Do not scale from this drawing.
2. All dimensions are in millimetres unless otherwise stated.
3. This drawing is to be read in conjunction with all relevant related documents and drawings.
4. No unauthorised disclosure, storage or copying.
5. This drawing is for development purposes only and should not be used for construction. This design is generic and provided indicatively only. This design is based on general Highways standards but does not incorporate the relevant local highway authority's requirements and design specifications, which would need to be followed at later design stages.
6. Drainage works/strategy have not been considered as part of this concept design and will need to be developed in liaison with the lead local flood authority / Environment Agency (EA) and local highways authority during subsequent stages of design. Replacement and/or realignment of existing drainage may be required, existing watercourses crossings may need to be replaced and mitigation measures may be necessary to account for an increase in impermeable areas.
7. Road markings and upright signs are defined to document The Traffic Signs and General Directions (TSRGD) 2016.
8. Safety buffer width at junction with the A120 is zero, since vehicles turning in/out of the junction are assumed to travel at a speed <30mph.
9. A temporary overrun area, to allow for the AIL vehicle passage, would need to be installed overlapping part of the proposed NMU track and swale. This would need to be managed as part of the Temporary Traffic Management measures. Protection measures would be required at the NMU track and swale.
Legend:
Onshore Red Line Boundary (Rev06)
Onshore Red Line Boundary
Existing carriageway edge on the southern side (from OS mapping)
Existing carriageway edge on the northern side (from OS mapping). Start of widening.
Proposed new carriageway edges after shifting away from driveways and widening
Extents of the proposed new carriageway widening
Proposed NMU track carriageway edging
Proposed NMU track carriageway surface
Proposed signing bollard
Extents of area where existing hatching is to be removed around the island
Current carriageway area to be freed from traffic and used as hard strip (if hatched) or verge (if grassed)
Provision for installation of drainage swale
Proposed temporary overrun area to be installed for AIL passage
Cway edge of the proposed temporary overrun area for AIL passage
NOT FOR CONSTRUCTION
Reference drawings
- 104580-MMD-00-XX-DR-CE-1065 - A120/Bentley Road junction - Alternative Alignment
- 104580-MMD-00-XX-DR-CE-1058 - Bentley Rd Improvements - Proposed Typical Cross Sections without kerb Cycle Track
- 107850-MMD-04-XX-DWG-D-1696 - A120 / Bentley Road Improvements (Offline Cycle Route) (dated 17/10/2023)
- Onshore Red Line Boundary (received 21/02/2024)
- Onshore RLB Rev 06 (received 22/02/2024)
Rev Date Drawn Description Chk'd App'd
P01 27/04/2024 SAP For information JW AFC
Status Stamp
FOR INFORMATION
MOTT MACDONALD
Client
NORTH FALLS
FIVE ESTUARIES
Title
Co-located Substation Early Design - Bentley Rd Improvements - Proposed Cross-over point for the NMU path at the junction for the proposed new Bentley Rd alignment (Sheet 01 of 01)
Designed S. Amado-Pedroso SAP Eng check J. Weeks JW
Drawn S. Amado-Pedroso SAP Coordination A. F. Crespo AFC
Dwg check J. Weeks JW Approved A. F. Crespo AFC
MMD Project Number 104560-001
Scale at A1 As indicated
Security STD
Client Number 005395305-01
Suit. Code S2
Drawing Number 104560-MMD-00-XX-DR-CE-1070
Revision P01


PROBLEM 2.2
1.857
32.9m
2m Extended Road Boundary
Scale 1:400
Red House Farm
PELHAMS CORNER
Castle Byeways
Pelhams Cottage
Notes
Key to symbols
Reference drawings
DRAFT
MOTT MACDONALD
NORTH FALLS
FIVE ESTUARIES
Co-located Substation Early Design
A120 - Bentley Road Junction
Alternative Alignment
Swept Path Analysis (SPA)
Sheet 01 of 01
104560
1:400
STD
005108632-02
S3
104560-MMD-00-XX-DR-CE-1066
P02

Contractor Coversheet

Project Name:	FE_NF_Mott Macdonald Co-Located Substation Studies	**Package No:**	PROJECTCODE12 - Electrical Systems

Document Title:	Co-Located Substation Early Design - A120-Bentley Road Junction Stage 1 RSA Designer's Response
Classification:	Confidential

Contractor Doc. No:	104560-MMD-00-XX-RP-HE-1087	**Contractor Revision:**	01
Date:	19/12/2024	**Pages:**	20

Employer Doc. No:	005587690-01	**Employer Revision:**	01
Document Status:	Design		
Reason for Issue	For Review		

MOTT MACDONALD

Co-Located Substation Early Design - A120-Bentley Road Junction

Stage 1 RSA Designer's Response

December 2024

Confidential

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Mott MacDonald
Victory House
Trafalgar Place
Brighton BN1 4FY
United Kingdom

T +44 (0)1273 365000
mottmac.com

Co-Located Substation Early Design - A120-Bentley Road Junction

Stage 1 RSA Designer's Response

December 2024

Confidential

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
01	19/12/2024	Sonia A. Pedrosa	John Weeks	Andrea F. Crespo	First Issue for Comment

Document reference: 104560 | 104560-MMD-00-XX-RP-HE-1087 | 01 | 005587690-01

Information class: Standard

Contents

Tables

Figures

Tables – Appendices

1 Introduction

This Road Safety Audit Response Report documents considered responses aligned with road safety 'problems' and 'recommendations' defined through the Stage 1 Road Safety Audit process.

1.1 Overview

This report documents original Stage 1 Road Safety Audit (RSA) 'problems' and 'recommendations' for the A120-Bentley Road junction design defined by the SLR Consulting Ltd. Road Safety Audit Team and includes formally considered RSA responses developed by Mott MacDonald Designers.

The audit was carried out by SLR Consulting Ltd on behalf of Five Estuaries Offshore Wind Farm Ltd., one of the Project Sponsors. The Overseeing Organisation for this Stage 1 RSA is National Highways.

The scheme subject to Stage 1 RSA comprises the reconditioning of the existing A120-Bentley Rd Junction to enable its use by high volumes of construction traffic due to the works related to the installation of haul roads, an export cable carrying power from a proposed offshore windfarm located off the coast of Essex and the construction of the two associated co-located substations. The A120-Bentley Road junction will undergo a series of improvements with the aim of reducing the detrimental impacts of heavy construction traffic to the Strategic Road Network.

These improvements will remain in place after the substation works have concluded and broadly include:

- the carriageway widening on the northern side of both Bentley Road and the A120,
- the realignment of a section of the Bentley Rd approach/exit arm,
- the installation of a merge lane at the A120 to facilitate vehicles' incorporation,
- the relocation and reconditioning of the existing traffic island at the junction,
- the improvement of the existing NMU track section and its extension along Bentley Rd (and beyond the junction), also implementing a safer cycle cross-over at the junction.

An Audit Brief was prepared by John Weeks of Mott MacDonald on the 1st October 2024, being formally accepted by the Audit Team on the same date. The Road Safety Audit was originally carried out with reference to the supplied Road Safety Audit Brief. The terms of reference of the Road Safety Audit are as described in the Design Manual for Roads and Bridges (DMRB) Standard, GG119 Road Safety Audit.

A site visit was undertaken by the Audit Team on Thursday 14th November 2024, between the hours of 13:00 and 14:30. The weather at the time of the visit was overcast and the carriageway surface was generally dry. Vehicular traffic levels were considered to be low. There were no pedestrian and no cyclist movements observed during this time.

The Road Safety Audit comprised an examination of the documentation and drawings listed in **Appendix A**. Accompanying drawings indicating the location of identified safety related issues are provided in **Appendix B**.

Figure 1.1 below shows the location of the accesses included in the scheme in a local context.

Figure 1.1. Location of the proposed A120-Bentley Rd Junction

Source: Mott MacDonald based on OpenStreetMap

1.2 Relevant Parties

Project Sponsor: **RWE (Five Estuaries Offshore Wind Farm Ltd.)**

Client: **RWE (Five Estuaries Offshore Wind Farm Ltd.)**

Designer: **Mott MacDonald**

The Road Safety Audit Team consisted of:

Alastair Pike	MICE, MCIHT, MSoRSA, HE Approved Cert. Comp. Audit Team Leader Head of Road Safety SLR Consulting Ltd
Ben Finch	Audit Team Member Senior Transport Planner SLR Consulting Ltd
Ross Corbyn	Audit Team Observer Senior Road Safety Engineer National Highways
Kelly Milburn	Audit Team Observer Spatial Planning Manager National Highways

The Road Safety Audit Designer Response has been prepared by:

John Weeks	Design Lead for the A120-Bentley Road Junction Improvement Works, Mott MacDonald
Sonia A. Pedrosa	Design Team Member for the A120-Bentley Road Junction Improvement Works, Mott MacDonald

The client representatives are:

Emmanuelle Bassey	Civil Engineering Lead, RWE
Alice Maynard	Engineering Manager, RWE

1.3 Report Structure

- **Section 2** comprises of a 'Road Safety Audit Decision Log'.
- **Section 3** includes audit response statements.

2 Road Safety Audit Decision Log

This section presents a road safety audit decision log, incorporating ‘Designer Responses’ to all identified problems and recommendations from the Stage 1 RSA; see **Table 2.1**.

Table 2.1: Road Safety Audit Decision Log

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Audit Team Supplementary Comment	Client / Project Sponsor Comment	Agreed RSA action
PROBLEMS IDENTIFIED AND ALIGNED RECOMMENDATIONS FROM STAGE 1 RSA						
Scheme: A120/Bentley Road Junction						
Drawing 104560-MMD-00-XX-DR-CE-1070_Rev01						
2.1	Location: A120/Bentley Rd Junction. Summary: Lack of hazard warning tactile paving provided at dropped kerbs leading to the NMU route may lead to collisions between NMUs and vehicular traffic. Design drawings show an extension of the NMU route adjacent to the A120. An existing splitter island will be amended with dropped kerbs and road markings to allow NMU users to leave the A120 Northwest bound. This design is not shown complete with hazard warning tactile paving that would alert NMUs particularly those with visual impairments that they are about to enter the vehicular carriageway. This arrangement may in turn lead to collisions between NMUs and vehicular traffic.	It is recommended that any access points to the vehicular carriageway are provided with the appropriate tactile paving installations.	• RSA problem acknowledged but recommendation partially dismissed due to the crossover movement only being allowed to northbound cycles and cycle access points to/from the carriageway not requiring the installation of tactile pavement. • To provide greater clarity to the crossing movements allowed at this crossover point and to improve safety, both for pedestrians and cycles, a segregated shared use section of the NMU track is to be added along the area of concern to direct pedestrians away from the crossover. Tactile pavement is to be installed at the start and end of this segregated shared use section of the NMU track, in line with the Department for Transport document: *Guidance on the Use of Tactile Paving Surfaces,* Section 5. Ladder tactile pavement shall be installed at the start/end of the pedestrian way within the NMU track for a depth of 2.4m each, and width of 1.5m (width of the pedestrian way). Tramline tactile pavement shall be installed at the start/end of the cycle way within the NMU track for a depth of 2.4m each, and width of 2m (width of the cycle way). The ladder and tramline tactile pavement will assist vision impaired people. Diagrams 956 & 957 mounted on bollards and installed at the start/end of the segregated shared use section of the NMU track would also assist all other users. The installation of Diagrams 956 & 957 is a recommendation within *Guidance on the Use of Tactile Paving Surfaces,* Section 5 and LTN 1/20 paragraph 9.4.3, however their installation shall be discussed with the ECC LHA to avoid sign clutter. The segregated shared use NMU track will direct pedestrians away from the crossover point at the junction, greatly reducing the risk of pedestrians trying to cross. It is also proposed that the carriageway at the cycle area of the segregated shared use NMU track is surfaced in a different colour than the rest of the NMU track, to make it more conspicuous to all users. • Additionally, the corner radii at the NMU track leg leading to the trafficked carriageway have been reduced to R=1m and the leg width, to 2.5m, except at the corner radii, to reduce comfort at making the turn. Edge of lane road markings have been proposed at the intersection of this leg with the NMU mainline cycle track and directional arrow road markings to emphasize the one-way character of this cycle track leg. • This matter will be appraised further, in conjunction with the Local Highways Authority, as an integral part of the detailed design process, when bespoke signing and road marking drawings and specifications are to be agreed and produced for the preferred solution.	To be populated by the Audit Team	To be populated by the Client / Project Sponsor	This matter will be appraised further, in conjunction with the Local Highways Authority, as an integral part of the detailed design process, when bespoke signing and road marking drawings and specifications are to be produced for the agreed preferred solution. All measures to increase safety, described at the Design Organisation Response column, to be added to drawing 104560-MMD-00-XX-DR-CE-1070_Rev02.
Drawing 104560-MMD-00-XX-DR-CE-1066_Rev02						
2.2	Location: A120/Bentley Rd Junction. Summary: Overrun of Exceptional 74.720m HGV into NMU corridor. Design drawings show swept path analysis of a multi axle drawbar HGV entering Bentley Road from the A120. The analysis drawing indicates that the body of this exceptional HGV will over sail the new NMU route as the vehicle turns from the A120 onto Bentley Road. This	It is recommended that banks persons are used where HGVs are required to make turns along the route to ensure that pedestrians and vulnerable road users are separated from large vehicle turning movements.	• RSA problem acknowledged and recommendation agreed. • The use of banks persons is implicit within the Temporary Traffic Management measures to be agreed with the Local Highways Authority. These TTM measures shall be detailed at a later stage of the project. • A note specifying the use of banks persons shall be added to drawing 104560-MMD-00-XX-DR-CE-1066_Rev03 for clarity.	To be populated by the Audit Team	To be populated by the Client / Project Sponsor	A note specifying the use of banks persons shall be added to drawing 104560-MMD-00-XX-DR-CE-1066_Rev03 for clarity. TTM measures shall be detailed and agreed with the LHA at a later stage of the project.

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Audit Team Supplementary Comment	Client / Project Sponsor Comment	Agreed RSA action
	arrangement may lead to collisions between exceptional HGVs and NMU's on the shared use path.					

3 Audit Response Statements

This section summarises the RSA process status and provides response statements from Mott MacDonald as designers and RWE (as Project Sponsor and Client) consistent with the Design Manual for Roads and Bridges (DMRB) Road Safety Audit guidelines contained within document GG119 Road Safety Audit.

Design Organisation Statement

On behalf of the Design Organisation, we certify that: **The RSA actions identified in response to the Road Safety Audit problems in this Road Safety Audit have been discussed and agreed with the Project Sponsor / Client.**	
Name:	John Weeks
Signed:	[redacted]
Position:	Highways Design Lead
Organisation:	Mott MacDonald
Date:	19/12/2024

Project Sponsor / Client Statement

On behalf of the Project Sponsor / Client I certify that: **The RSA actions identified in response to the Road Safety Audit problems in this Road Safety Audit have been discussed and agreed with the Design Organisation; and** **The agreed RSA actions will be progressed.**	
Name:	Alice Maynard
Signed:	[redacted]
Position:	Engineering Manager
Organisation:	RWE
Date:	19/02/2024

Appendices

A. Documents and Drawings Referenced

Table A.1: Documents and Drawings Referenced

Ref.	Title	Date
Stage 1 RSA: 402.065339.00001	Stage 1 Road Safety Audit – A120 / Bentley Rd, Five Estuaries Wind Farm_Rev01	20/11/2024
Design Drawing: 104560-MMD-00-XX-DR-CE-1066_Rev02 (Client No. 005108632-02)	Co-located Substations Early Design – A120-Bentley Road Junction – Alternative alignment Swept Path Analysis (SPA)_Rev02	08/03/2024
Design Drawing: 104560-MMD-00-XX-DR-CE-1070_Rev01 (Client No. 005395305-01)	Co-located Substations Early Design – Bentley Rd Improvements – Proposed Cross-over point for the NMU path at the junction for the proposed new Bentley Rd alignment_Rev01	27/09/2024
RSA Brief Document	240118_Bentley Road-A120 Stage 1 RSA Brief	21/08/2024

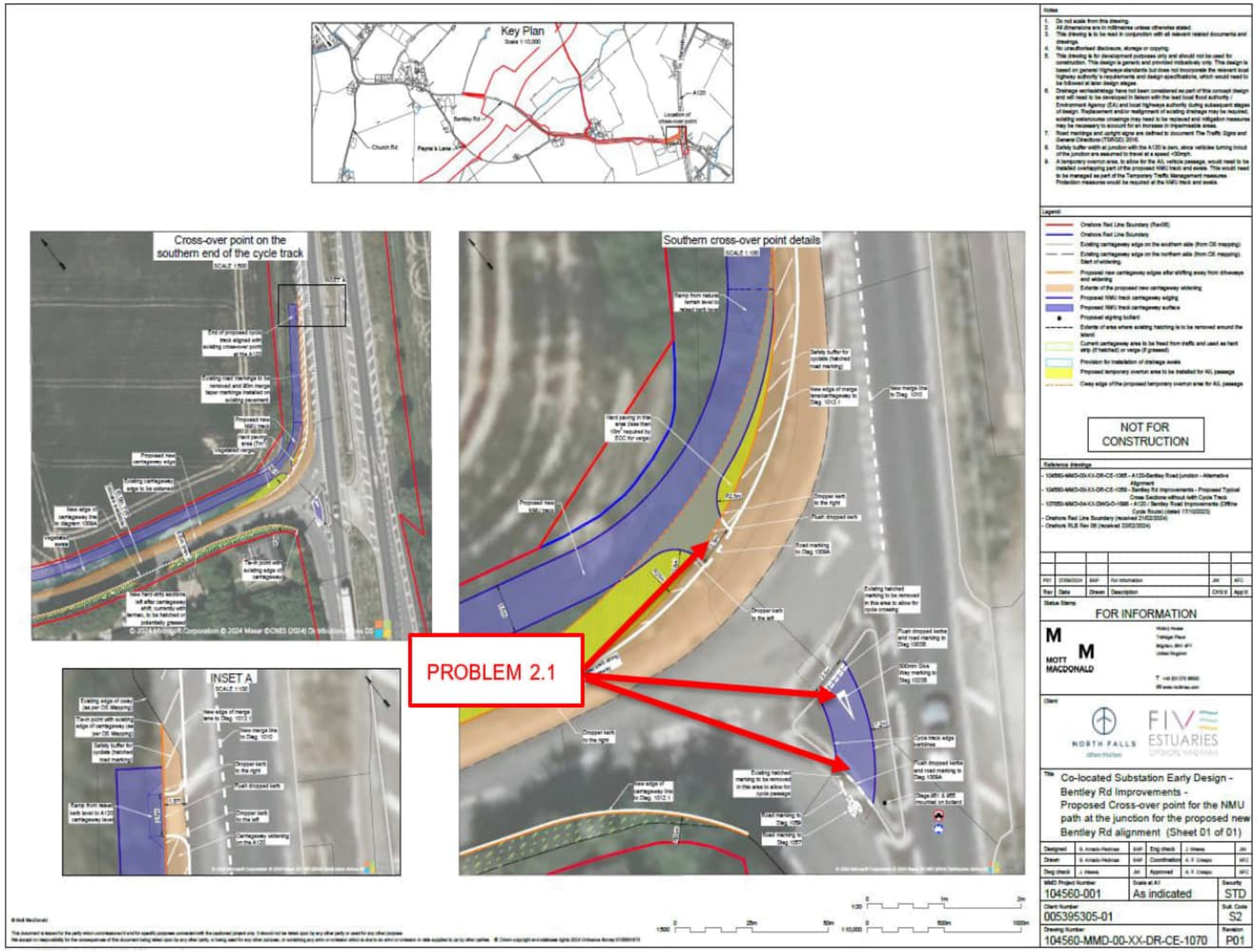
Source: Mott MacDonald

B. Key Plan - Drawing subjected to Stage 1 RSA

Drawing 104560-MMD-00-XX-DR-CE-1070_Rev01

Five Estuaries Offshore Wind Farm
Stage 1 Road Safety Audit

20 November 2024
SLR Project No.: 402.065339.00001



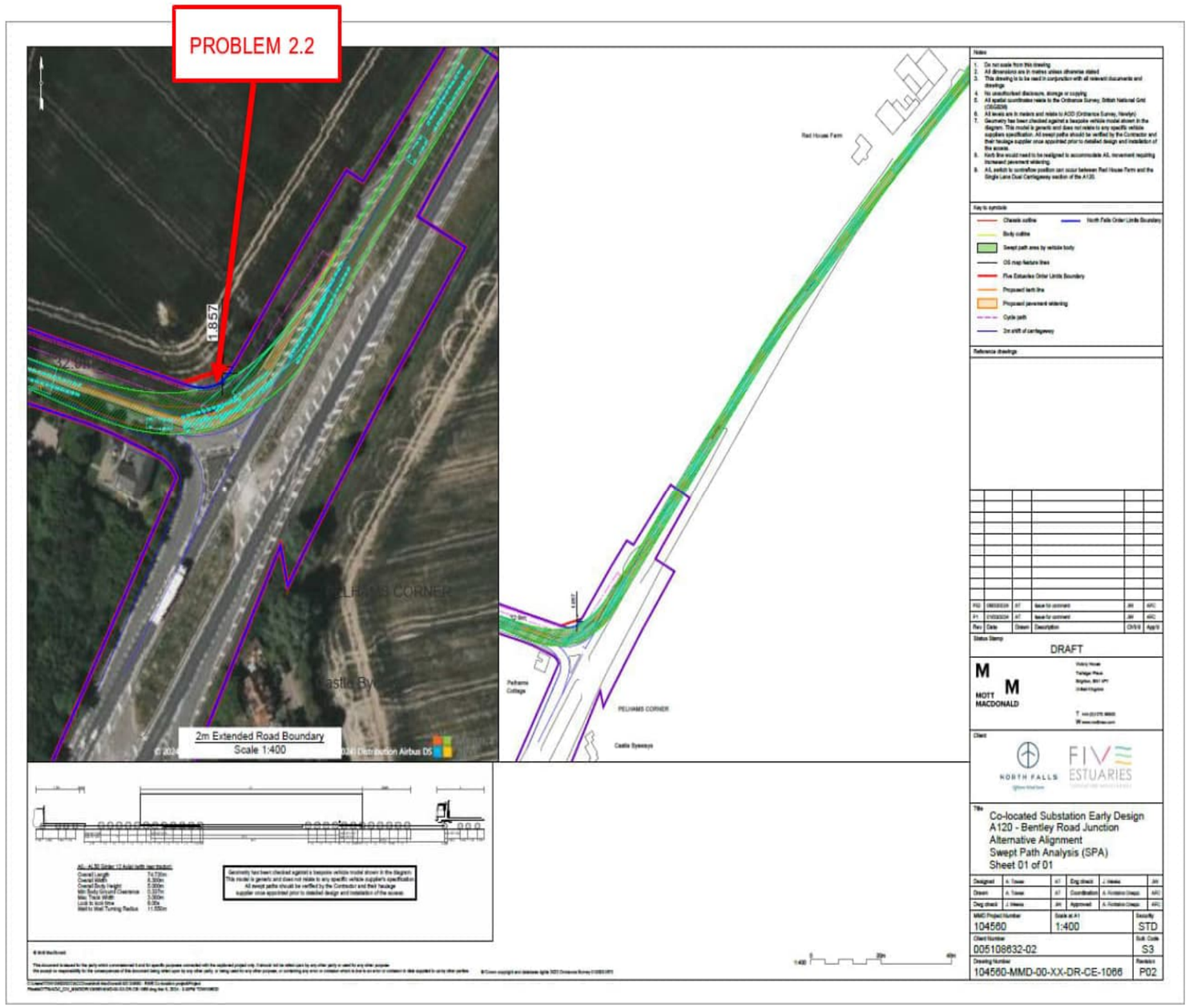
C-1

(Source: SLR Consulting, Stage 1 RSA Audit, Problem Location Plan C-1, SLR Project No.:402.065339.00001)

Drawing 104560-MMD-00-XX-DR-CE-1066_Rev02

Five Estuaries Offshore Wind Farm
Stage 1 Road Safety Audit

20 November 2024
SLR Project No.: 402.065339.00001

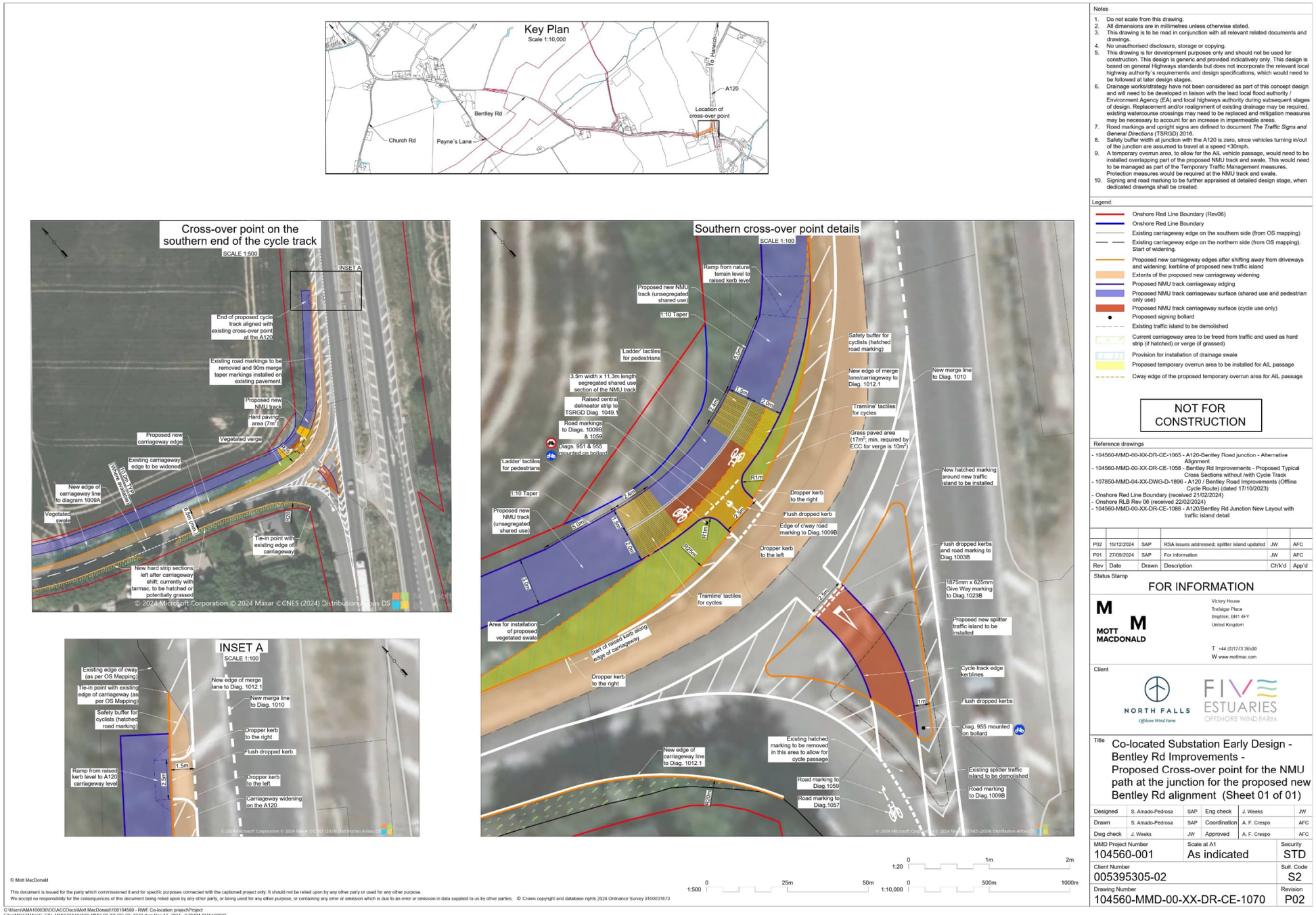


C-2

(Source: SLR Consulting, Stage 1 RSA Audit, Problem Location Plan C-2, SLR Project No.:402.065339.00001)

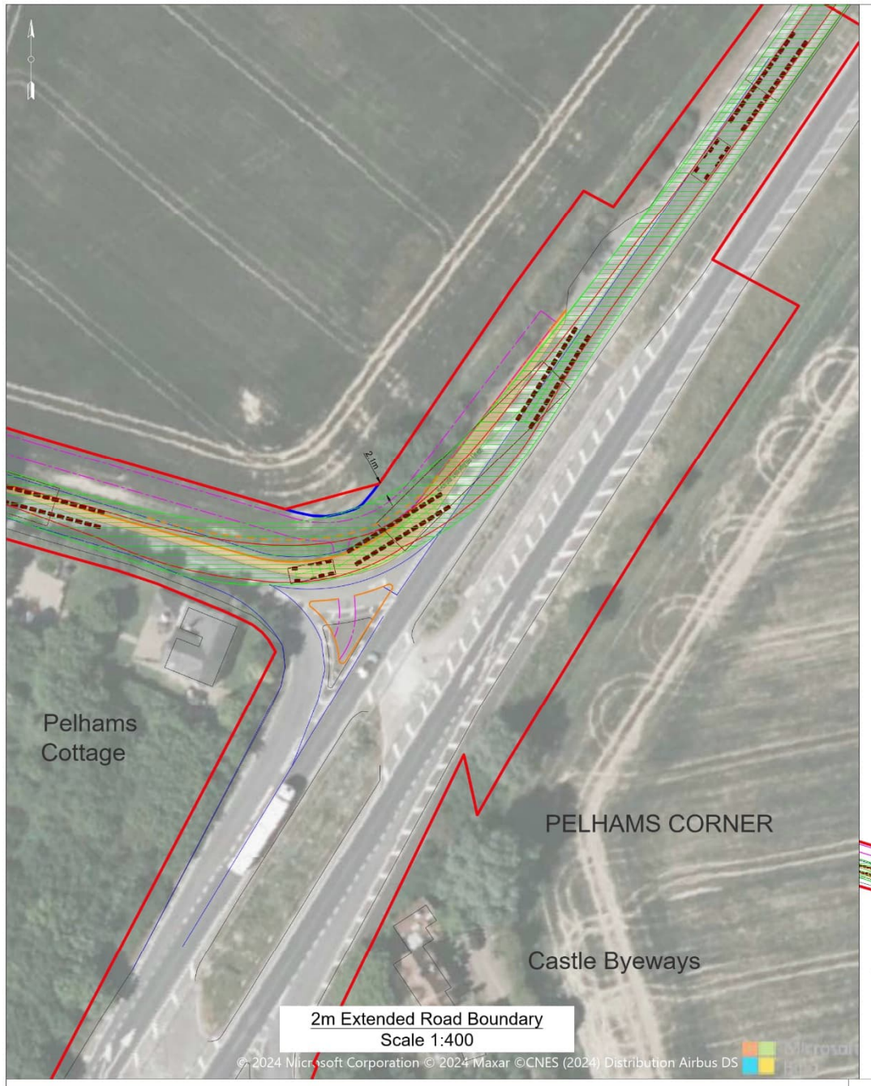
C. Key Plan – Drawings incorporating addressed Stage 1 RSA comments

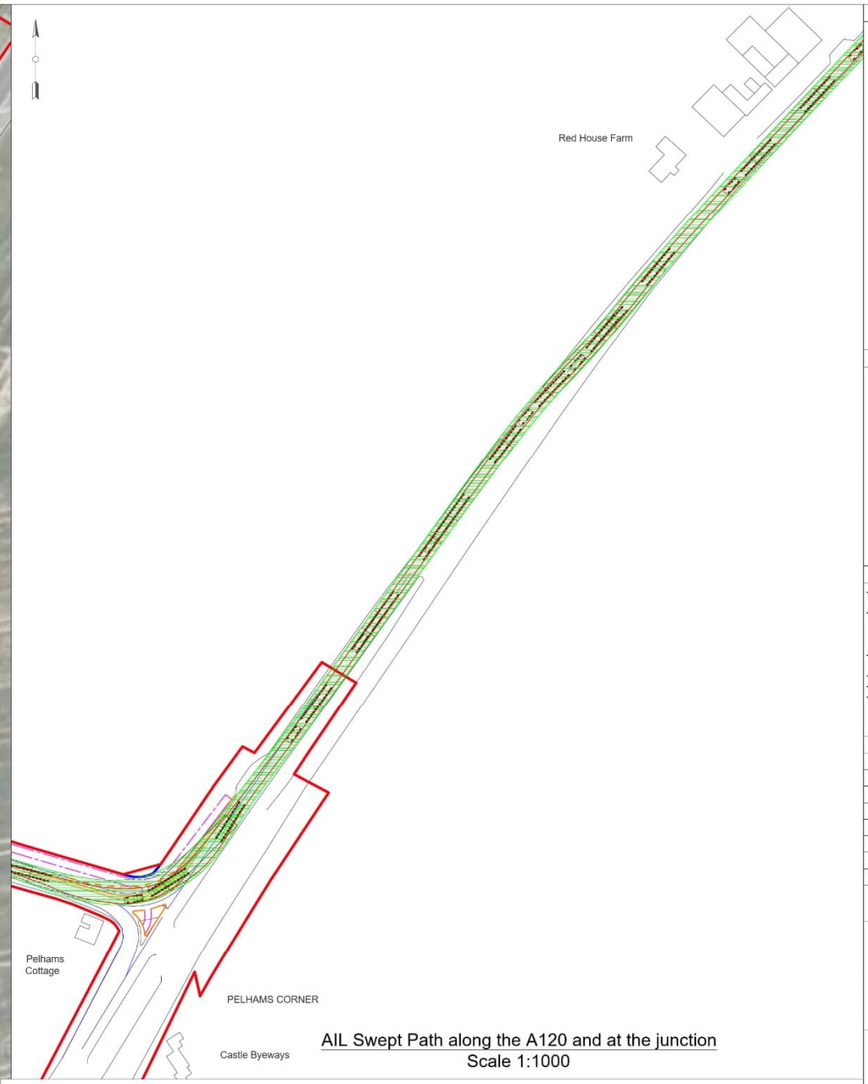
Drawing 104560-MMD-00-XX-DR-CE-1070_Rev02



(Source: Mott MacDonald, Stage 1 RSA Audit Response)

Drawing 104560-MMD-00-XX-DR-CE-1066_Rev03





Notes

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3. This drawing is to be read in conjunction with all relevant documents and drawings
4. No unauthorised disclosure, storage or copying
5. All spatial coordinates relate to the Ordnance Survey, British National Grid (OSGB36)
6. All levels are in meters and relate to AOD (Ordnance Survey, Newlyn)
7. Geometry has been checked against a bespoke vehicle model shown in the diagram. This model is generic and does not relate to any specific vehicle suppliers specification. All swept paths should be verified by the Contractor and their haulage supplier once appointed prior to detailed design and installation of the access.
8. Kerb line would need to be realigned to accommodate AIL movement requiring increased pavement widening.
9. AIL switch to contraflow position can occur between Red House Farm and the Single Lane Dual Carriageway section of the A120.
10. Banks persons shall be used where the AIL is required to make turns along the route to ensure that pedestrians and vulnerable road users are separated from large vehicle turning movements.

Key to symbols

- OS map feature lines
- North Falls Order Limits Boundary
- Five Estuaries Order Limits Boundary
- Chassis outline
- Body outline
- Swept path area by vehicle body
- Proposed kerb line / edge of carriageway
- Proposed overrun area
- Proposed pavement widening
- NMU track
- New edges of carriageway/lane after the 2m shift in front of driveways

Reference drawings

- 104560-MMD-00-XX-DR-CE-1065 - A120-Bentley Road junction - Alternative Alignment
- 104560-MMD-00-XX-DR-CE-1070 - Co-located Substation Early design - Bentley Rd Improvements - Proposed Cross-over point for the NMU path at the junction for the proposed new Bentley Rd alignment
- 107850-MMD-04-XX-DWG-D-1896 - A120 / Bentley Road Improvements (Offline Cycle Route) (dated 17/10/2023)
- Onshore Red Line Boundary (received 21/02/2024)
- Onshore RLB Rev 08 (received 22/02/2024)
- 104560-MMD-00-XX-DR-CE-1086 - A120/Bentley Rd Junction New Layout with traffic island detail

Rev	Date	Drawn	Description	Ch'k'd	App'd
P03	19/12/2024	SAP	RSA issues addressed; splitter island updated	JW	AFC
P02	08/03/2024	AT	Issue for comment	JW	AFC
P1	01/03/2024	AT	Issue for comment	JW	AFC

Status Stamp: FOR REVIEW AND COMMENT

MOTT MACDONALD
Victory House
Trafalgar Place
Brighton, BN1 4FY
United Kingdom
T +44 (0)1273 36500
W www.mottmac.com

Client: NORTH FALLS Offshore Wind Farm; FIVE ESTUARIES OFFSHORE WIND FARM

Title
Co-located Substation Early Design
A120 - Bentley Road Junction
Alternative Alignment
Swept Path Analysis (SPA)
Sheet 01 of 01

Designed	A. Towse	AT	Eng check	J. Weeks	JW
Drawn	A. Towse	AT	Coordination	A. Fontaina Crespo	AFC
Dwg check	J. Weeks	JW	Approved	A. Fontaina Crespo	AFC

MMD Project Number	Scale at A1	Security
104560	1:400	STD
Client Number: 005108632-03		Suit. Code: S3
Drawing Number: 104560-MMD-00-XX-DR-CE-1066		Revision: P03

AIL- AL50 Girder 12 Axial (with rear tractor)

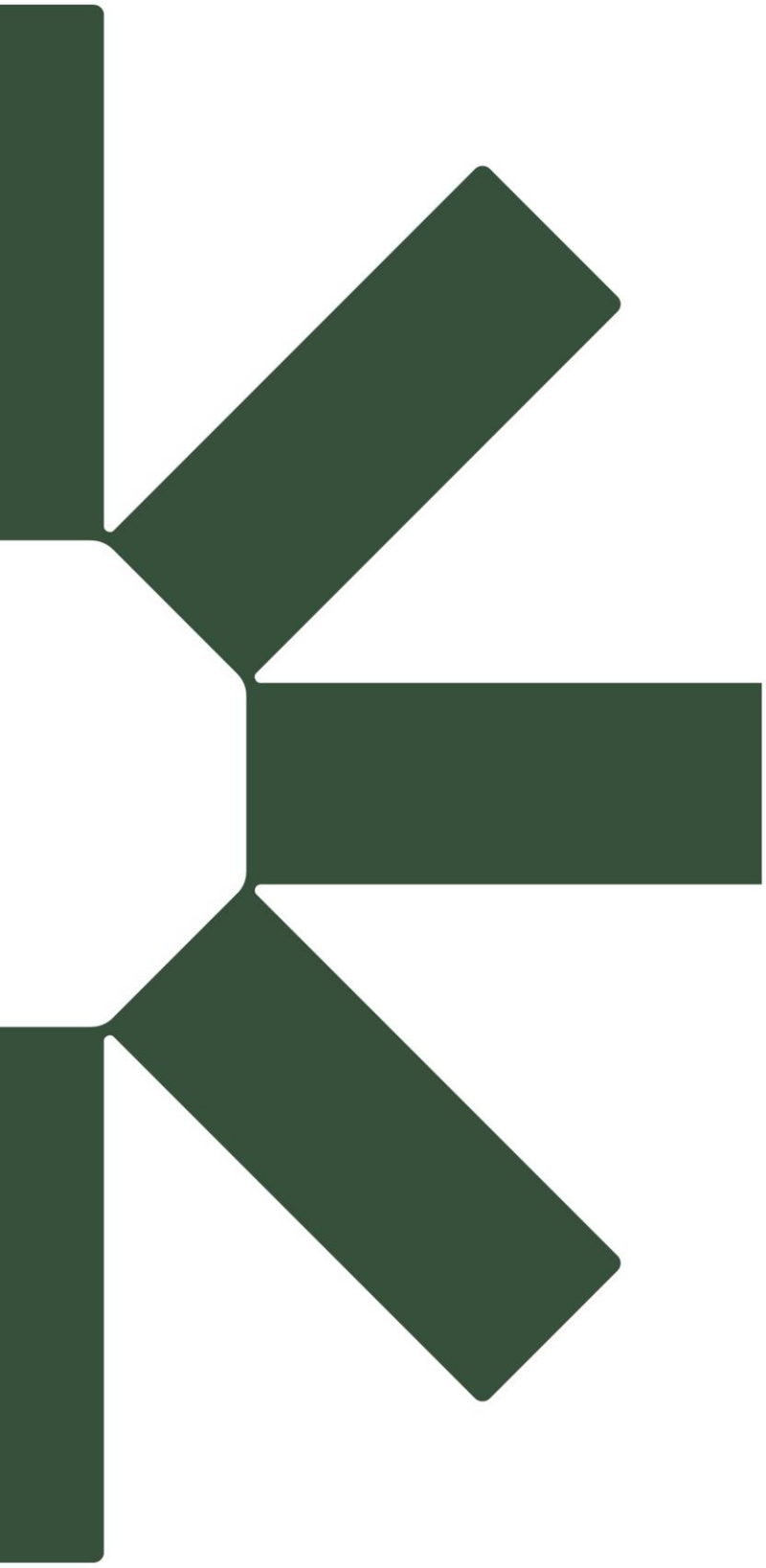
Overall Length	74.720m
Overall Width	6.300m
Overall Body Height	5.000m
Min Body Ground Clearance	0.337m
Max Track Width	3.000m
Lock to lock time	6.00s
Wall to Wall Turning Radius	11.550m

Geometry has been checked against a bespoke vehicle model shown in the diagram. This model is generic and does not relate to any specific vehicle supplier's specification. All swept paths should be verified by the Contractor and their haulage supplier once appointed prior to detailed design and installation of the access.

1:400 0 20m 40m
1:1000 0 50m 100m

C:\Users\AMA100030\DCACCDocs\Mott MacDonald\100104560 - RWF Co-location project\Project Files\MOTTMAC\C_CIV_MMD\DR\104560-MMD-00-XX-DR-CE-1066.dwg Dec 17, 2024 - 11:35AM AMA100030

(Source: Mott MacDonald, Stage 1 RSA Audit Response)



Making Sustainability Happen

Appendix Y Abnormal Indivisible Load Investigations

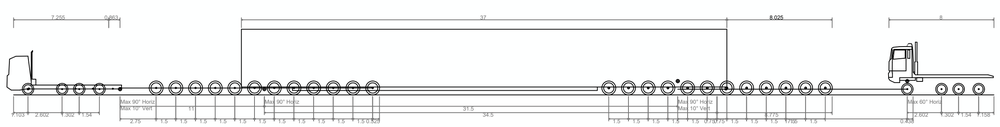
Volume 6, Part 6, Annex 8.1 Transport Assessment (Onshore)

Five Estuaries Offshore Wind Farm

Five Estuaries Wind Farm Ltd

SLR Project No.: 404.V05356.00010

23 September 2024



AIL- AL50 Girder 12 Axial (with rear tractor)

Overall Length	74.720m
Overall Width	6.300m
Overall Body Height	5.000m
Min Body Ground Clearance	0.337m
Max Track Width	3.000m
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Wall to Wall Turning Radius	11.550m

Geometry has been checked against a bespoke vehicle model shown in the diagram. This model is generic and does not relate to any specific vehicle supplier's specification. All swept paths should be verified by the Contractor and their haulage supplier once appointed prior to detailed design and installation of the access.

Notes

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8. Kerb line would need to be realigned to accommodate AIL movement requiring increased pavement widening.
9. AIL switch to contraflow position can occur between Red House Farm and the Single Lane Dual Carriageway section of the A120.

Key to symbols

- Chassis outline
- Body outline
- Swept path area by vehicle body
- OS map feature lines
- Five Estuaries Order Limits Boundary
- Proposed kerb line
- Proposed pavement widening
- Cycle path
- North Falls Order Limits Boundary

Reference drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd
P3	07/03/2024	AT	Issue for comment	JW	AFC
P2	23/02/2024	AT	Issue for comment	JW	AFC
P1	08/02/2024	AT	Issue for comment	JW	AFC

Status Stamp

DRAFT

MOTT MACDONALD

Victory House
Trafalgar Place
Brighton, BN1 4FY
United Kingdom

T +44 (0)1273 36500
W www.mottmac.com

Client

NORTH FALLS Offshore Wind Farm

FIVE ESTUARIES OFFSHORE WIND FARM

Title

Co-located Substation Early Design
A120 - Bentley Road Junction
Swept Path Analysis
"contra-flow" Option
Sheet 01 of 01

Designed	A. Towse	AT	Eng check	J. Weeks	JW
Drawn	A. Towse	AT	Coordination	A. Fontaina Crespo	AFC
Dwg check	J. Weeks	JW	Approved	A. Fontaina Crespo	AFC

MMD Project Number	Scale at A1	Security
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Client Number		Suit. Code
005069954-03		S3
Drawing Number		Revision
104560-MMD-00-XX-DR-CE-1064		P3

1:400 0 20m 40m

FIVE ESTUARIES
OFFSHORE WIND FARM

PHONE 0333 880 5306
EMAIL fiveestuaries@rwe.com
WEBSITE www.fiveestuaries.co.uk
ADDRESS Five Estuaries Offshore Wind Farm Ltd
Windmill Hill Business Park
Whitehill Way, Swindon, SN5 6PB
COMPANY NO Registered in England and Wales
company number 12292474